NATURE MAGAZINE

arch, 1947 50 Cents Vol. 40, No. 3

Keep Your Copies of Nature Magazine in this Fine Binder!

NATURE MAGAZINE never grows old. It is more than a magazine; it is an encyclopedia of information on nature subjects, presented as attractively as fiction and illustrated so aptly as to make you a witness of the endless procession of nature happenings. Every issue of the magazine is worth keeping and reading again and again.

Thousands of subscribers bind their copies for the permanent preservation of the wealth of factual information they contain.

For your convenience and pleasure, we have selected the very best binder we could find. It is a handsome, finely grained dark green, gold-embossed binder—a creditable addition to any reading table or library. It is light, strong, and durable. Copies of the magazine can be inserted, one at a time, without cutting or punching, simply by the snap of a little unbreakable wire. And, best of all, it opens flat like a bound book which makes it easy to handle and to read.

PRICED LOW

At $2.50

Your money will be refunded if you are not entirely satisfied.

OPENS FLAT LIKE A BOOK.

Each binder will hold the issues of NATURE MAGAZINE for a full year—or as long as you wish to retain them in the binder. Meanwhile the contents are protected from handling, tearing and from being mislaid or carried away. Get greater enjoyment out of your magazines by binding them and by so doing make distinctive and welcome additions to your library. You can, in time, acquire a reference library on nature subjects beyond compare.

Mail your order with remittance to

AMERICAN NATURE ASSOCIATION

1214 16th St., N. W. Washington 6, D. C.

DO BIRDS REMEMBER?

By Ellaine Elmore

Birds, like people, come to Cape Cod for pleasant summer living. Many varieties of birds are familiar guests in the leafy trees, but rarely do we see the Baltimore oriole so far North.

One summer, to my delight, I saw the long, pouch-shaped nest of the oriole hanging from a maple bough on eye level with the second story windows. They came and they went that summer, like streaked flashes of brilliant sunshine. The little ones came and went too.

Papa Oriole evidently liked checks for nest building, or he used what he would find. One long strand of black and white checked gingham was woven through the nest. The most distinctive feature was a piece of heavy twine, which passed from the top of the nest, down the entire side, passing under it as though to secure the weight, and up again on the other side. It was as firmly fastened as human hands could have made it.

The next spring the orioles did not seek my hospitable maple. I saw them fly across the dune to some far-away tree. But soon they were daily passing back and forth like tenants looking for a better location. Then one day, standing at the second story window on a level with last year's nest, I saw Papa Oriole, his little body firmly braced against a twig, as he tried again and again to loosen the heavy cord that passed around the bottom of his last year's home. His bill looked as sharp as a scissors, yet the knot resisted him. His efforts were so continued, so intense, one wished he might be helped in his self-appointed task. Evidently not discouraged, but needing rest, he flew back across the dune.

The next day he appeared again, going through the same efforts to unloosen the heavy cord. His bill pulled and tweaked and twisted, as he braced his body, first to one position, then in another, to get a better purchase on the hard-tied knot. He returned many times, in his effort to get that strong cord to build into his new home. Perhaps his failure that time may point the way to some future success.

Memory is strong motivation in humans; we recognize its potency in both conscious and unconscious reactions. Perhaps we have not considered memory as an attribute of birds. Yet what but memory — conscious or unconscious — could have sent Papa Oriole back to the tree where he knew he would find the heavy cord he had formerly used in building his home?

Waterfowl in 1947

Although many requests have been received by the U. S. Fish and Wildlife Service for a forecast of the migratory waterfowl hunting regulations for 1947, Albert M. Day, Director of the Service, asserts that it is impossible to venture an opinion in advance. Data gathered from mid-winter inventories will be combined with continent-wide spring and summer studies, during migration and on the breeding grounds, as a basis of final decision next June or July. The Fish and Wildlife Service has as its goal the most complete waterfowl survey ever made.

L. L. Bean Honored

Outdoors-going people all over the world, and to the number of some 600,000, annually receive the L. L. Bean catalog of outdoor equipment. This was brought out at a testimonial dinner given to the 74-year-old Freeport, Maine, sporting goods manufacturer. Starting his business on a loan of $400 from a bank, Mr. Bean built the enterprise to an operation grossing $1,500,000 annually. In its history he has manufactured a half-million of his famous leather-topped hunting rubbers. Governor Horace A. Hildreth and many other eminent Maine citizens paid tribute to Mr. Bean for his contributions to comfort and safety in the outdoors, to Maine, and to Freeport.

SAMMY THE SEAGULL

By Celia Ruth Fisher

One day I was sitting in my office in a coast town when a shadow darkened the small casement window. I looked up in time to see a great fluttering of white wings, and a seagull swooping away, grasping some stale bread that I had put on the sill earlier that morning. Next day I put out a crust and again he came, and from then on I provided the bread for my visitor. He was a large gull, spotlessly white, with yellow feet and beak. At the extreme tip of the beak was a single spot of vivid scarlet.

The gull was getting tamer day by day. He would no longer rush away, panic-stricken, at the slightest move I made inside the room. After gobbling up the bread he would swoop and dive and circle around before departing.

One morning I was deep in my work when there was a loud rapping on the windowpane. There was Sammy the Seagull banging the glass with his curved beak—a most indignant expression on his face. I had forgotten his breakfast. After that I would wait for him. He would bang on the glass to let me know he was there. As I carefully opened the casement he would fly in a small circle, then, seeing the window safely closed, he would alight on the sill, a most benign expression on his face. He ate his breakfast with evident enjoyment, and when he was finished would utter some blood-curdling honks and screeches while looking directly at me. He was, I am sure, saying, "Thanks a lot, pal; see you tomorrow!"

No.101
Triple-Tread
"TRIPLE-WARE" Steel Wheels

They're Back Again!

Yes, Sir! The World's Greatest Roller Skates—"CHICAGO'S" are now available, though limited. They are the Choice of Champions and preferred by parents for their children.

CHICAGO FLYING SCOUT Roller Skates

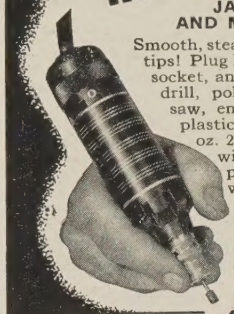
Equipped with Triple-Tread, "TRIPLE-WARE" Steel Wheels for long wear, perfect Ball Bearings for smooth running and Rubber Cushioned Shock Absorbers which smooth out the rough spots.

Demand "CHICAGO'S"—order from your Dealer Today!

CHICAGO ROLLER SKATE CO.
World's Greatest Roller Skates for Over 45 Years
4451 WEST LAKE STREET • CHICAGO 24, ILLINOIS

A TOOLSHOP IN YOUR HAND

JACK OF ALL TRADES AND MASTER OF PLENTY



Smooth, steady power at your fingertips! Plug Handee in any AC or DC socket, and you're ready to grind, drill, polish, rout, carve, sand, saw, engrave on metal, wood, plastic, horn, glass, etc. Wt. 12 oz. 25,000 r.p.m. In steel case with 40 accessories, postpaid, $27.50. Handee only with 7 accessories, $20.50. Satisfaction guaranteed.

Order Now! Prompt Delivery!

FREE! 52-Page Manual

CHICAGO WHEEL & MFG. CO.
1101 Monroe St., Dept. NA
Chicago 7, Ill.

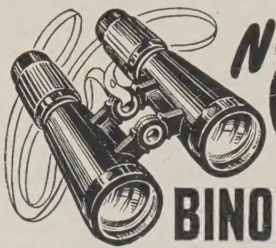
HANDEE TOOL OF 1001 USES

300 Printed Name & Address Labels 50¢

IN IMITATION LEATHER FABRIC CASE

1,001 diff. uses for these Appealing, Sparkling 2-color GUMMED LABELS nicely printed with your name and address. Stick 'em on Letters, Env., Books, Pkgs., etc. 300 labels bound in a neat imitation Leather Fabric CASE. Just 50¢ postpaid. MONEY BACK if not pleased. Please write clearly.

ANNUAL PRESS, Box 591-GD, Lynn, Mass.



NOW ONLY $2.89

BINOCULARS

Beautiful, streamlined BINOCULARS look far more expensive than they are! Easy to focus, individual for each eyepiece. All plastic light weight body. Neck strap. Optically ground lenses, 2½ power meets ordinary needs. SEND NO MONEY. Pay $2.89 plus postage thru postman on arrival. Cash orders sent prepaid. Use 10 days, if not satisfied in every way return for full refund.

MILLER AND COMPANY, DEPT. 347-C
215 N. Michigan Ave., Chicago 1, Ill.

Nature in Print

By HOWARD ZAHNISER

SOME TIME AGO I commented, in passing, on the title of Percy Thayer Blogg's *There Are No Dull Dark Days,* and on the colored illustration from the book's advertising leaflet that then illuminated a dark corner in my wife's kitchen.

"Nightly," says I, "as I drink milk and stuff my mouth with crackers, I come under the influence of this optimistic title and the colored illustration below it. Beneath an overcast sky a red sunset illuminates a rustic bridge, makes bright the green foliage of trees along the stream, and reveals the reflection of stream bank, trees, and bridge in the quiet pool between the bridge and me. The bright sunset has all but obscured the dull dark sky."

Later, when I had read and enjoyed several browse-readings of the book itself, it occurred to me that the "sunset" may actually be a sunrise, and on reflection I prefer this possibility while realizing the appropriateness of the uncertainty. Percy Thayer Blogg obviously writes with a nostalgia of reminiscence that is a sunset mood, but his book also has the vitality of the sunrise.

When Mr. Blogg asks the exclamation "What is more wonderful in the early spring than the pleasure of tenting out!" he comments that "The delicious quiet and freedom of just sitting in the tent door at the close of the day listening to the vesper songs of the birds is something soothing and far away . . . it carries one back from our highly artificial and complicated way of living, giving him a glimpse of the quiet peace and simplicity of the olden times." But in another essay it is the beginning of life—the "hurrying life" of spring outdoors—that stirs Mr. Blogg.

"In the blustering month of March," he writes, "we see life stealing out of the back of somewhere, life which has been missing through the cold months of the long winter, but now, watch for an hour and you will see the miracle taking shape before your eyes." And he calls the days of early springtime "the gayest, loveliest and most wonderful of all the year."

Perce Blogg, as Talbott Denmead calls him in an eloquent foreword, has brought together in his one small volume his own sketches resulting from sporting excursions, and has sprinkled them with his drawings, photographs, and verses—the remembrances that make it possible for him now, in any place at any time, to live in any season. On Christmas day, even, he lives in the spring—

> Where the Pond Lilies breathe their sweet perfume,
> Where the Red Bud bursts in purple bloom,
> Where the Cardinal sings his clarion call,
> And blends his voice with the waterfall.

And, for his friends and his readers, he has added (with a certainly inspired title) one more volume to the many but none too numerous books that tell of the seasons.

Whoever lives in a temperate zone and spends—or longs to spend—his days in the open is sure to find the rhythm of the seasons a tempo that fits his reading. It is one of the enjoyments of Roderick L. Haig-Brown's *A River Never Sleeps* that its arrangement is month by month. The anglers, to whom it is particularly addressed, will find it thus easier for the cover-to-cover reading it merits, or for the occasional reading that it may tempt in any month. And its progress through the season will intrigue many who are not anglers but who will find in its lore and contemplations the sort of reading that has been expected of angler-authors ever since Izaak Walton wrote. One might even suspect *A River Never Sleeps* of being a classic of its sort, with a permanent place on the shelf along with many of the volumes that Mr. Haig-Brown describes in a most valuable essay on "Fishing Books," included in his December gatherings.

Mr. Haig-Brown admits that he does not know why he fishes, but he speculates that it may be "only an excuse to be near rivers," and he says: "I do know that if it were not for the strong quick life of rivers . . . I should fish less often." And again he writes:

"A river is water in its loveliest form; rivers have life and sound and movement and infinity of variation; rivers are veins of the earth through which the life blood returns to the heart. Rivers can attain overwhelming grandeur . . .; they may slide softly through meadows or batter their way down mountain slopes and through narrow canyons; they may be heavy, almost dark, with history . . .; or they may be sparkling fresh on mountain slopes through virgin forest and alpine meadows."

It requires no fishing experience to enjoy such interpretations of the earth as that. Hal Borland—whose *An American Year* is the most satisfying calendar of essays that I have seen recently published—has no angling intentions when he records "The trickling waters are awake now and creeping through the grass roots, down the late March hillsides," but he surely shares—as will many others—Mr. Haig-Brown's fascination with rivers.

"Man," writes Hal Borland in *An American Year,* "is not an aquatic animal, but from the time we stand in youthful wonder beside a Spring brook until we sit in old age and watch the endless roll of the sea we feel a strong kinship with the waters of this world. . . . We sleep content with the drone of rain on the roof. We slake our thirst with cool waters of the earth. And we go forth at this time of year to see and hear the little streams trickling down the hills of Spring."

Mark Van Doren in "Time and Water"—a typically excellent poem in his new book of verse, *The Country Year,* explores consciousness of a beaver to interpret this same fascination. Here is the poem, in full:

> The humped back of the beaver, and the four
> Curved teeth that bring the poplar splashing down—
> There in the lake it lies, and the silver branches
> Turn, in the day, in the night, to a watery brown—
> The upthrust and pond-dividing whiskers
> Say that the world is wet, and seasons drown.
>
> Swimming in darkness, nearing his willow dam,
> Pausing before he climbs to the dripping sticks,
> He is eternally far from hills and deserts,
> Roads, and the odorous barns, and the drying ricks;
> The beaver is only credulous of meadows
> A rising river enters and moistly licks.
>
> Diving in darkness, down to the lily roots,
> Turning and paddling off and rising slow,
> The beaver descends again and finds his burrow,
> Rises again and is home, and he says: I know.
> Water is endless, time is an undulation,
> Water is all there is, and seasons flow.

The Ivy

By DANIEL SMYTHE

In early evening after the knives of dark
Had grown to giant flats with edges gone,
I hear the hissing rain that makes its mark
Against the wall that ivy grows upon.
The tendrils of the ivy grip the wall,
Hanging unseen. But I hear rainy trees—
The stems, the points, with moisture touching all,
And dripping down to greater mysteries.

One can well represent, in a reviewer's few lines, Hal Borland's and Mark Van Doren's books by such single selections, yet the writings of these men, whose observations are as varied as they are philosophical, are likewise rich on other subjects. In "March" —the month with which he begins his year—Hal Borland writes also of the equinox, of grackles, of clearing out bull briars, and of the bluebird, whose breast he calls "the color of a July sunburn on a blond skin," and for each of the months he has thus a series of small subjects on which he places great importance and writes with charm and vividness. Mark Van Doren starts also with the spring, and creates his poetry from the small things of the earth and from the richness of his own experience. He knows well both the nobility of country living and the nobility of great poetry, and there is much of both in *The Country Year*—most memorably perhaps in the long poem "A Winter Diary" which concludes the volume.

It is not always that one rejoices in the passing of the old year which the Spring will always entice one to forget. So the warmth of at least one spring that "made a certain winter disappear" brought to Mark Van Doren more of remembrance than anticipation. It was, as he writes—

The winter of all winters I would keep
Had I the power to put this warmth asleep
And make the world remember what I saw.

And in "A Winter Diary" he has attained so much of this power that surely the remembrance is assured for at least the world that Mark Van Doren has known.

It is, in fact, apparent in this group of books, which chronicle the seasons, that, at least in the moments of writing, it is as pleasant to recall the winters of experience as it is to anticipate the springs. *There Are No Dull Dark Days* would, indeed, with Percy Blogg's permission, be a good title for an entire shelf of such books. And one cannot fail to note how attractive such works are to the artists . . . how well this is demonstrated by Louis Darling's exquisite and superb living sketches for *A River Never Sleeps* and by John O'Hara Cosgrave's appropriately simple and engagingly real drawings for *The Country Year*. Percy Thayer Blogg's sketches are as delightful as his paragraphs, and Hal Borland's *An American Year* is a veritable album of outdoor etchings, woodcuts, and lithographs from the Associated American Artists. It is a happy year in more ways than one that finds its way into a nature calendar.

An American Year: Country Life and Landscapes Through the Seasons. By Hal Borland. New York: Simon and Schuster. 1946. 200 pp., with 50 illustrations—etchings, woodcuts, and lithographs—reproduced through the courtesy of Associated American Artists Galleries. $3.50.

The Country Year: Poems. By Mark Van Doren. New York: William Sloane Associates. 1946. 131 pp., with 58 drawings by John O'Hara Cosgrave II and full-color lithograph binding. $2.75.

A River Never Sleeps. By Roderick L. Haig-Brown. New York: William Morrow & Co. 1946. 352 pp., with 25 drawings by Louis Darling. $4.

There Are No Dull Dark Days. By Percy Thayer Blogg. Baltimore: H. G. Roebuck & Son. 1944. 92 pp., with 60 drawings, 32 half-tones on 21 pages, and sunrise/sunset color plate on cover and jacket.

Science—Four Centuries

Science Since 1500. By H. T. Pledge. New York. 1946. Philosophical Library. 357 pages. Illustrated. $5.00.

This is a short history of mathematics, physics, chemistry and biology prepared by the librarian of the Science Museum of London. "Brevity," says the author in his preface, "has been secured by suppressing biography and the human sciences, sociology, anthropology, psychology, economics. To balance this, the story itself has been thrown against a background of the human and economic factors in successive periods rather than against the more intellectual and philosophical backgrounds which have mainly interested writers of previous general works. . . ."

Genetics

Elements of Genetics. By Edward C. Colin. Philadelphia. 1946. The Blakiston Company. 402 pages. Illustrated. $3.50.

This is a second edition of a textbook for college students in biology taking lecture and laboratory courses in genetics. It places special emphasis upon the application of the principles of the Mendelian heredity to man, and the roles played by heredity and environment in his development. This second edition presents much new work.

Museum Attendance

With two days to go in 1946, entrance guards at the Chicago Natural History Museum had clocked 1,286,045 visitors for the year, a record attendance, according to Clifford G. Gregg, director. Two coal strike dimouts and a bus strike are believed to have kept the attendance from being even higher. The Museum has resumed its expeditionary activities, with several groups in the field.

"An amazing story . . . catching the enchantment of the wilderness with its background of mountains, lakes, trees and untamed creatures."
—*Natural History*

"One of the most distinguished and consistently absorbing books of the outdoors since the days of Ernest Thompson Seton."
—*Boston Globe*

". . . one of the best in many years."
—ALAN DEVOE
Saturday Review of Literature

". . . far and away the best of its type."
—JOSEPH HENRY JACKSON
San Francisco Chronicle

Driftwood Valley

By THEODORA C. STANWELL-FLETCHER

With 18 animal sketches by John F. Stanwell-Fletcher

At all bookstores $4.00

Alone together for months on end in the bleak Arctic winter and the glorious spring and summer, a man and a woman adjust themselves to the hardships of the far north and turn its changing seasons to their pleasure.

An Atlantic Monthly Press Book
LITTLE, BROWN AND COMPANY

NATURE MAGAZINE

PUBLISHED BY THE AMERICAN NATURE ASSOCIATION

To Stimulate Public Interest in Every Phase of Nature and the Out-Of-Doors, and Devoted to the Practical Conservation of the Great National Resources of America

IN THIS ISSUE

March, 1947 Vol. 40, No. 3

Mountain Goats.....Hexom Cover
Nature in Print.....Howard Zahniser 114
The Ivy (Poem).....Daniel Smythe 114
Contents Noted.....R. W. W. 119
Leaf Gall (Poem)...Gertrude Ryder Bennett 120
Vegetable Jewels at Work
Eugene W. Nelson 121
Bird Greens.....W. L. McAtee 125
A Palolo Feast on Samoa
Ardis Edwards Burton 127
"Two in the Bush" (Quiz)
Mabel Irene Huggins 128
Robins in White.....H. Roy Ivor 129
Architecture of the Desert
John Lindsey Blackford 131
Wild Leek.....Marie Barlow Buckman 132
Oregon's Vertical Park.....Harold Olson 133
Otter Adventures.....Hugo H. Schroder 134
Transcript of a Frosty Morning
Oscar Ostlund 136
The Little Brown Jug
George Elwood Jenks & Kay McKay 137
Mexican School Zoo
George McClennan Bradt 140
Florida Birds Awing.....Hugo H. Schroder 142
Sentimentalism Again (Editorial)..... 145
Harvesters of the Plains...David F. Costello 146
Ant Hill (Poem).....Herbert Merrill 148
Memorial Gardens and Highways
Andrew S. Wing 150
Kentucky's Red Deer Problem.Carlos Vinson 153
The Heaven's from Earth's Poles
Isabel M. Lewis 155
The School Page.....E. Laurence Palmer 157
Camera Trails.....Edna and Bill Evans 158
Under the Microscope..Julian D. Corrington 166

NATURE MAGAZINE, PAST AND PRESENT, IS INDEXED IN THE READER'S GUIDE IN YOUR PUBLIC LIBRARY

U. S. AND CANADA
ONE YEAR.....$4
FOREIGN...$.75 EXTRA
TWO YEARS.....$7
LIFE $100

A. B. McClanahan, Advertising Manager

ADVERTISING OFFICES

New York 17—295 Madison Avenue Los Angeles 15—Western Pacific Bldg.
Washington 6—1214 16th St., N.W. San Francisco 4—Mills Building
Chicago 1—203 N. Wabash Avenue Minneapolis 2—233 Radisson Hotel

NATURE MAGAZINE is published monthly, October to May, inclusive, bimonthly, June to September, inclusive, by the American Nature Association. Entered as second-class matter May 31, 1927, at the post office at Washington, D. C., U. S. A., and accepted for mailing purposes at the special flat rate of postage provided for in the United States Postal Act of October 3, 1917, and February 28, 1925. $4 a year; foreign $4.75.

Publication and Editorial Office, 1214 16th Street, N.W., Washington 6, D. C.

Copyright, 1947 by American Nature Association. Title Registered U. S. Patent Office. Printed in the United States.

THE ASSOCIATION

RICHARD W. WESTWOOD.....President
Washington, D. C.

HARRY E. RADCLIFFE.....Vice-President
Washington, D. C.

JAMES A. O'HEARN.....Secretary-Treasurer
South Orange, N. J.

DR. E. LAURENCE PALMER.....Director, Nature Education
Cornell University, New York

ARTHUR NEWTON PACK .....President Emeritus
Abiquiu, N. M.

THE MAGAZINE

RICHARD W. WESTWOOD.....Editor

EDWARD A. PREBLE.....Associate Editor

JULIAN D. CORRINGTON.....Microscopy Editor

ISABEL M. LEWIS.....Astronomy Editor

E. LAURENCE PALMER.....School Editor

ANDREW S. WING.....Garden Editor

HOWARD ZAHNISER.....Book Editor

EDNA and BILL EVANS.....Photograph Editors

R. BRUCE HORSFALL.....Artist

HARRY E. RADCLIFFE.....Business Manager

SCIENTIFIC CONSULTING BOARD

DR. LELAND O. HOWARD
Retired Chief, U. S. Bureau of Entomology

DR. WALDO L. SCHMITT
Curator of Marine Invertebrates, U. S. National Museum

DR. HARRY C. OBERHOLSER
Cleveland Museum of Natural History

W. L. McATEE
Technical Adviser, U. S. Fish and Wildlife Service

DR. PAUL BARTSCH
Curator of Mollusks, U. S. National Museum

DR. EDGAR T. WHERRY
Wild Flower Preservation Society

DR. WILLIAM M. MANN
Director, National Zoological Park

Monument

Under the title "A Monument to My Son," W. J. Schoonmaker wrote the letter below for the July, 1946, *Natonal Humane Review.* It was printed there with the hope that it would further the idea of setting aside sanctuaries for wildlife in the memory of loved ones. We reprint it here with the same hope.

MY DEAR BOY:

The very day that you were born I began to plan for your future. I promised you fine things—not man-made things that many can buy, but God-made things that are priceless.

Before you were a month old, I planted a tree—for you. And since that time I have planted many hundreds more.

When you were a year old, I promised you land, plenty of land and where you could roam about and collect treasures that money could never buy.

I did not fence that land of yours, my Son, and all could come and go as they pleased. But one rule must always endure—nothing should be destroyed. And to this very day, my Boy, that rule has been sacredly respected.

Upon that land of yours, the life blood of no animal has every been spilled. The flowers have grown and withered but none have been plucked and the baby trees that I planted for you have grown, unbitten by the woodsman's axe.

In leafy branches the wild birds nest; in hollow limbs the gray squirrels dwell and 'neath the earthbound roots the wood mice make their homes.

Fearlessly, the raccoons and the minks wander along the shore of the unspoiled stream. No rusty jaws of steel lie hidden here to grind into their tender paws.

The timid, brown-eyed rabbits romp about their briers and when summer has passed, the beechnuts and acorns fall among the golden leaves on the forest floor. Here the antlered bucks and slender does find food, and no slugs of lead from hidden rifles tear into their quivering flesh to bring agony and death.

The partridges drum here and the trout leap from quiet sheltered pools where barbed hooks have never stung a bony jaw.

Here is Peace, for here on your land is Sanctuary.

I'm sitting now beneath a slender tree —the first one I planted for you. I remember when you sat here, on this very spot, and cried because a wild dappled fawn bounded away when you wanted so to hug it. I can see the branches of the pine into which you climbed to put a baby owl back into its nest. And there's the pool where you saved the baby mouse from drowning.

It was on this land, my Son, that you learned to be gentle and kind. It was here that you found greatness.

I—I promised you fine things. I believe that I kept my promise, for this peaceful land, rich with nature's treasures, is the finest thing that I could possibly have given to you.

A telegram came today from the Government and I know that you will never return. This sanctuary is no longer your land, it is a monument to you, my Son.

It's no use mailing this letter now, so I'll just bury it here beneath your first tree.

Goodbye, my Son. MOTHER

Gray Hair Department

For some inscrutable reason, known only to printers, our printer got the seventh and eighth pages of the pictorial insert in the January, 1947, issue transposed. The result is that it makes mighty confusing reading unless you adopt the Oriental order of reading these last two pages. Since the editor cannot spend his time in the composing room and the press room of the printer's establishment, he has to send the magazine to press and hope for the best, meanwhile adding more gray hairs to his rapidly whitening and thinning thatch.

Soils of the Forest

Forest Soils. By Harold J. Lutz and Robert F. Chandler, Jr., New York. 1946. John Wiley and Sons. 514 pages. Illustrated. $5.25.

At the same time that the agriculturist has come to a full realization of the basic importance of soil as a resource for the production of food crops, the silviculturist has recognized soil as influencing in the same way the character and quality of forest crops. Soil science as applied to forestry is of relatively recent acceptance, and this book serves as one of the first textbooks in this field. It also provides a splendid source of reference to research on forest soils.

Bird Slide-films

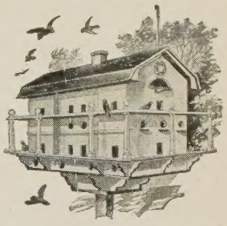
A new series of six discussional slide-films entitled "Basic Bird Studies" has been produced by The Jam Handy Organization, 2821 E. Grand Boulevard, Detroit 11, Michigan. These are designed for classroom or lecture purposes, and so planned as to fit in with reading materials, experiments and field trip activity.

Silver Anniversary

With its December number in 1946, *Yosemite Nature Notes,* official publication of the Yosemite Natural History Association, completed twenty-five years of existence. In that period this little magazine has carried the story of Nature in Yosemite National Park to a wide and enthusiastic audience.

ATTRACT SONG BIRDS

BIRD HOUSES
By Dodson



Designed by America's foremost bird authority—a model to attract every desirable song bird. Quality built, exclusive features. Add charm to your garden. Befriend birds and they will rid your premises of insects.

One martin destroys 2000 mosquitoes a day.

Dodson's Famous Sparrow Trap

The humane way to get rid of these pests. Writes one man "Well pleased with trap. 26 caught today and season just opened." Made of strong, welded tin wire. Will last for years. Empty trap once a day, releasing good birds. Size 36x18x12". With Receiving Box $16.50 f.o.b. Kankakee. Send for free catalog and description of Sparrow Trap or 10c for "Your Bird Friends—How to Win Them."
JOSEPH H. DODSON CO.
749 Harrison St., Kankakee, Ill.

GEMS and CRYSTALS

From world wide sources. Send for illustrated catalog listing choice crystals, rough and cut gems, all genuine. Catalog is yours for the asking. Write today.
V. D. HILL
Complete Gem and Mineral Establishment
Route 7, Box AB, SALEM, OREGON

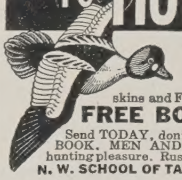
HOWDY, PODNAH!

If you drink warm milk at the bar and wear lace on your shorts, you won't like Western Sportsman. It's a he-man's magazine about the New West—charging grizzlies, wily bucks, fighting trout, adventure, humor, etc. 7 issues $1. Special Gift Rate: Three (or over) 12 issue subs., $1. each. Each person limited to 100,000 subs.
Western Sportsman, Dept. M, Austin, Texas

CHINCHILLAS
Producer of exquisite, precious chinchilla fur
Fine, pedigreed, guaranteed breeding stock.

T. M. TOWNE
1538N Idlewood Road Glendale 2, Calif.

LEARN TO MOUNT BIRDS



ANIMALS, FISH, PETS.
Be a Taxidermist. Save your hunting TROPHIES. Have a fine home-museum. Hunters, save and MOUNT your beautiful DUCKS, QUAIL, DEER, TAN skins and FURS. Great Fun. Spare-time PROFITS.
FREE BOOK Tells ALL about it. 100 fine wild-game pictures, 48 pages. Send TODAY, don't delay. Get this WONDERFUL FREE BOOK. MEN AND BOYS, Learn Taxidermy. Double your hunting pleasure. Rush letter or POSTAL today. STATE AGE.
N. W. SCHOOL OF TAXIDERMY, Dept. 2943, Omaha, Neb.

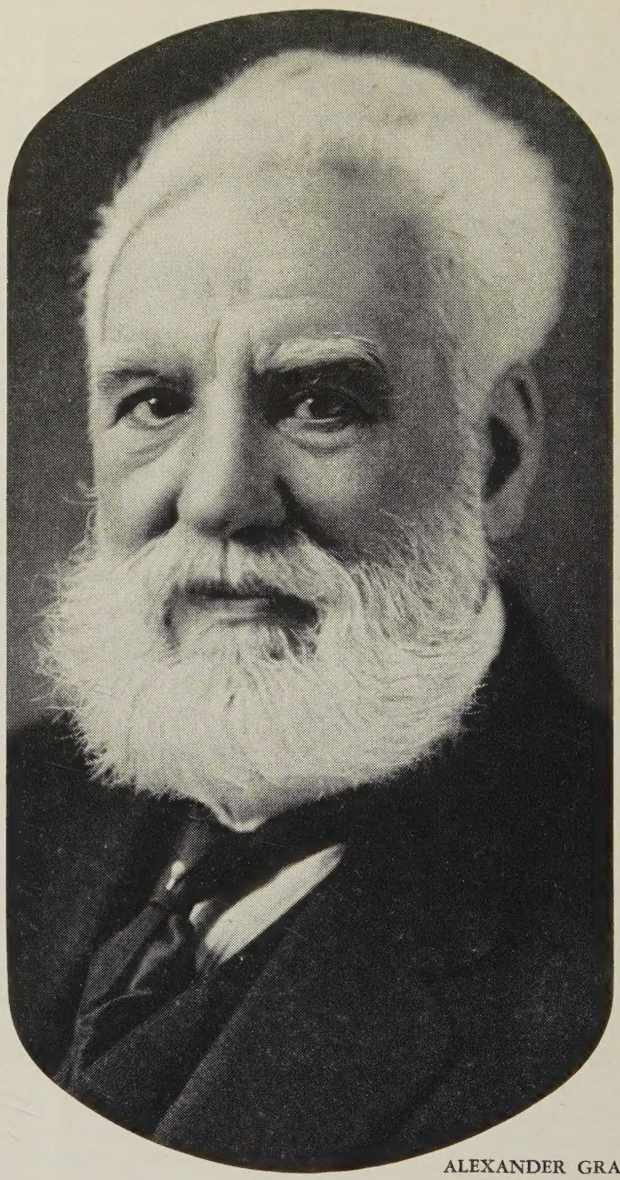
EARTHBOUND

IS THERE a strange, ethereal mental cord that binds the consciousness of those departed from this world with those who remain? Is psychic phenomena a farce or fact? Let the Rosicrucians (not a religious organization), reveal the *satisfying truths* about these *mysteries of self* to you. Write for *free* introductory Sealed Book. Address: Scribe B.H.R.
The ROSICRUCIANS
SAN JOSE (AMORC) CALIFORNIA

★ 100th Anniversary of the Birth of Alexander Graham Bell • March 3, 1947 ★

He gave the world

a new voice



ALEXANDER GRAHAM BELL
by Moffett, 1918

Alexander Graham Bell was a teacher of the deaf. He was also a trained scientist who made it possible for millions upon millions of people to hear each other by telephone.

The telephone brought something into the world that had not been there before.

For the first time people were able to talk to each other even though separated by long distances.

Horizons broadened. A new industry was born, destined to employ hundreds of thousands of men and women and be of service to every one in the land.

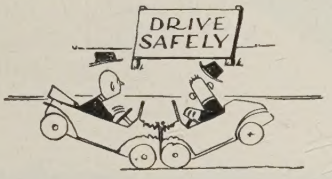
Alexander Graham Bell was a great humanitarian, not only as a teacher of the deaf, but in his vision of the benefits the telephone could bring to mankind.

Bell's vision has come true. It keeps on being an essential part of this nation-wide public service.

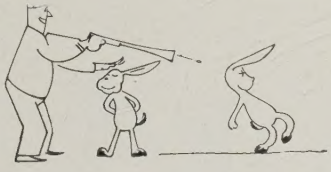
BELL TELEPHONE SYSTEM

Contents Noted

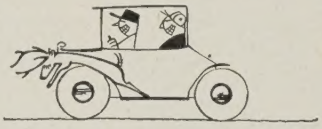
THERE is some pretty fuzzy reasoning in the endorsement by the National Committee for Traffic Safety of a program of highway billboards to teach safety. Actually the billboard itself is a menace to highway safety. It may take only a second to get some sort of safety or other message from an outdoor advertising sign—usually it takes more—but, in a second, at sixty miles an hour, an automobile travels eighty-eight feet. And in that particular second the attention of the driver has been diverted from the vital job of driving. Hospitals, cemeteries and auto junk yards contain many by-products of such inattention. There is no question as to the necessity of constant highway safety education, and there is no lack of media through which its message may be carried. But the billboard is certainly not one of them.



"I GIVE my pledge as an American to save and faithfully to defend from waste the natural resources of my country—its soil and minerals, its forests, waters and wildlife." For this pledge *Outdoor Life* gave its first award of $5000 to L. L. Foreman of Santa Fe, New Mexico. Choice of this pledge is credit to the committee on awards. It is a fine statement. But the issue of *Outdoor Life* in which the award is announced contains articles on how to kill the increasingly rare bighorn sheep; hunting black bear with hounds in Michigan; killing gray foxes; how to get a buck deer; success at killing geese; shooting pheasants from the hip. Somehow the fine words reproduced on the front cover and articles within do not seem to go together.

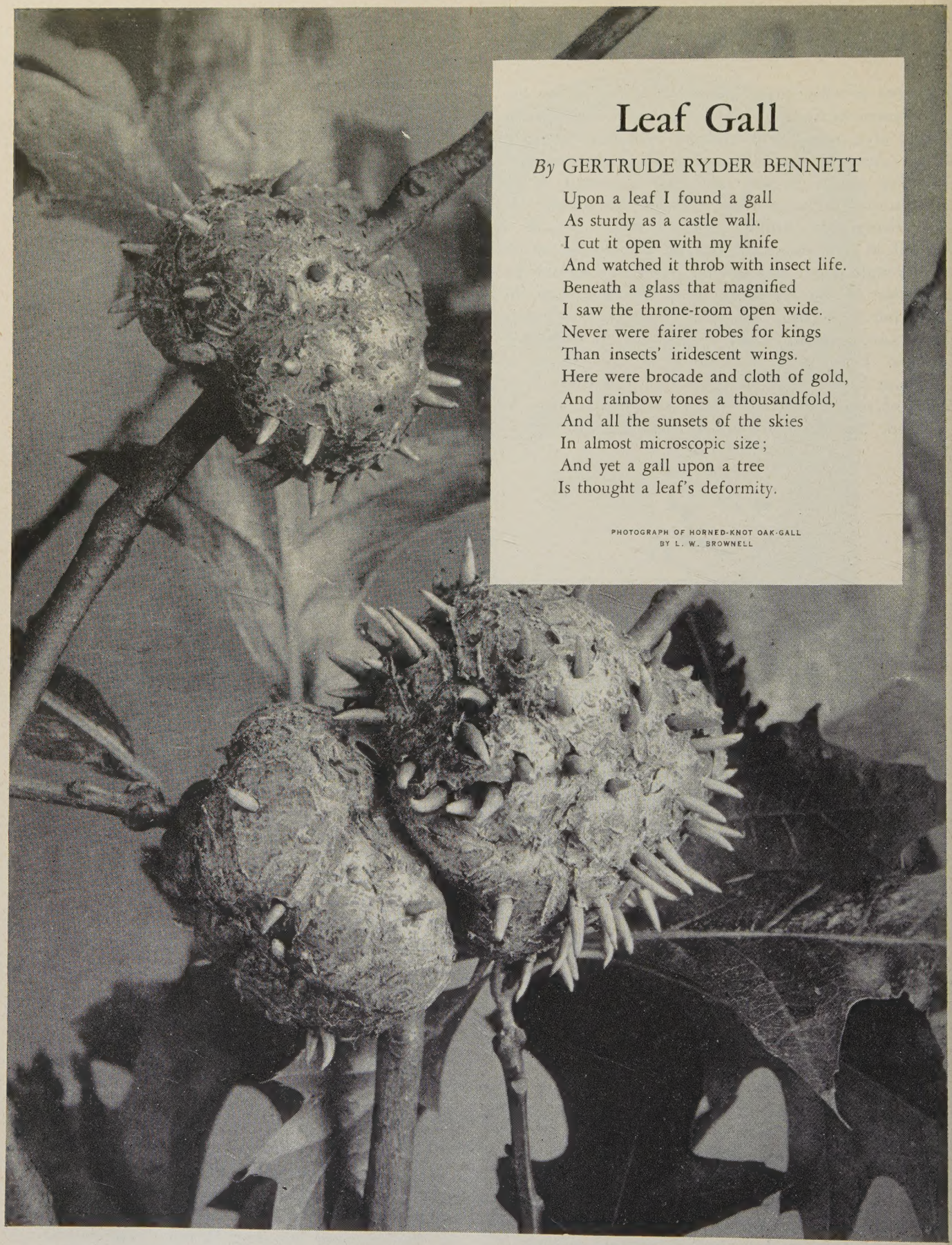


APPARENTLY aroused by the sight of automobiles of United States hunters draped with the carcasses of deer, J. V. McAree, columnist of the Toronto *Globe and Mail*, wrote a piece about deer killing. His mail response was voluminous, and revealed a widespread distaste for the deer hunter. It also provided a wealth of material for a long and interesting column of quotes. One correspondent, with amusing objectivity, wrote: "You have the hunter all wrong. He is merely an egocentric who imagines that when he gets into his callithumpian clothes he is the object of envy of all other men and of awe to all women. . . . The deer itself is only incidental in that it serves, he thinks, to draw attention to the hunter, and also when he gets it home he can cut it up and unload unwanted hunks on various acquaintances." One hunter wrote that he could not see the "difference in shooting a deer, or any other wild bird or animal, or in the killing of a pet lamb, calf or any other domesticated animal." To which the columnist replied: "We have yet to hear of anybody who thought it was sport to kill a pet lamb. Killing for food and killing for the sating of a blood lust seem to us to be two different things. It was against the destroying of beauty in the name of sport that we protested." We wish that space permitted more extensive quotation of Mr. McAree's column and its voluntary contributions, which so graphically reveal a distaste for killing among the larger, unorganized, non-gunner public. It is the same revulsion we have so often heard expressed in the motion picture theater when a "killing" short is run. So, perhaps, the gunner is not quite the fine fellow he thinks he is when he dons the garb and assumes the sobriquet of sportsman.



WE HAVE never been able to work up any overpowering enthusiasm for "weeks" dedicated to this or that worthy idea or noble cause. This is because it has always seemed that this hebdomadal hurrahing should be on an all-year-round basis. We know this to be true so far as wildlife conservation is concerned, so, in calling attention to the fact that March 16 to 22, 1947, will be National Wildlife Restoration Week, may we express the hope that any seeds sown during those days will germinate and flourish throughout the year, and in years to come. The National Wildlife Federation is sponsor of this particular "week," and the 1947 observance will be the tenth such dedication. An inquiry to the Federation at 20 Spruce Street, Boston 8, Massachusetts, will bring further information about this event.

In advance of Wildlife Week, the Federation has brought out its annual sheet of wildlife stamps, presenting forty studies of birds, mammals, fishes, flowers and trees among the sixty-four stamps of the sheet. Since these stamps were first issued they have covered three-hundred and ninety-four different Nature subjects—a miniature outdoor picture gallery. The originals of the stamps have been painted by leading Nature artists, including Walter A. Weber, Francis L. Jacques, and Margaret Masson. The stamps are sold at one dollar a sheet by the main headquarters of the Federation, 1129 Vermont Avenue, N.W., Washington 5, D. C. R. W. W.

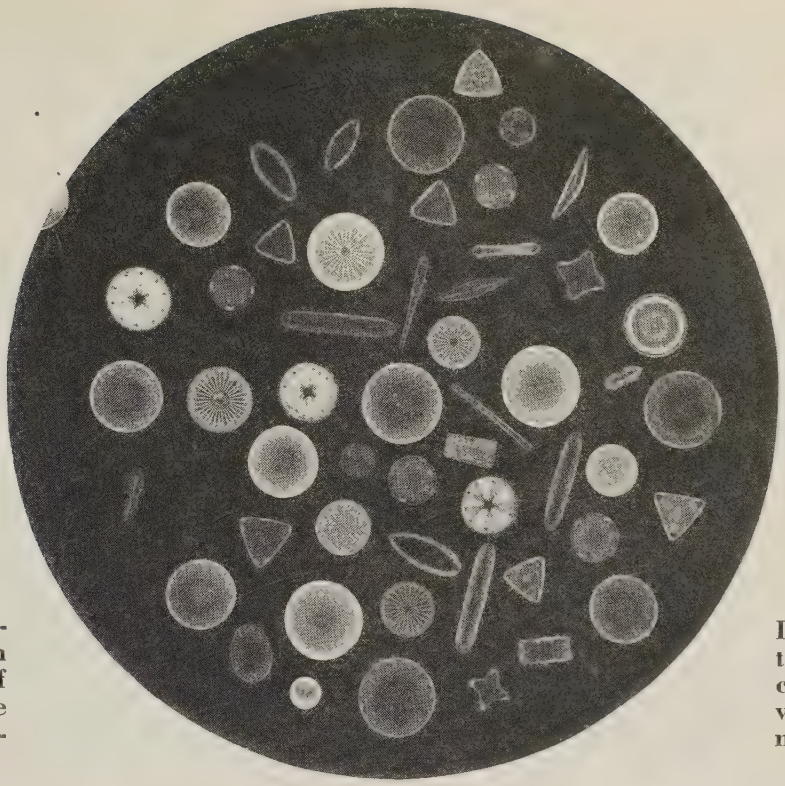


Leaf Gall

By GERTRUDE RYDER BENNETT

Upon a leaf I found a gall
As sturdy as a castle wall.
I cut it open with my knife
And watched it throb with insect life.
Beneath a glass that magnified
I saw the throne-room open wide.
Never were fairer robes for kings
Than insects' iridescent wings.
Here were brocade and cloth of gold,
And rainbow tones a thousandfold,
And all the sunsets of the skies
In almost microscopic size;
And yet a gall upon a tree
Is thought a leaf's deformity.

PHOTOGRAPH OF HORNED-KNOT OAK-GALL
BY L. W. BROWNELL



Fifty different diatoms. More than ten thousand varieties of these tiny plants have been classified by experts.

It is only because of the microscope that we can see these minute vegetable jewels, which now have so many valuable uses.

Vegetable Jewels at Work

By EUGENE W. NELSON

About two hundred and fifty years ago a queer fellow dwelt in the city of Delft, Holland. His name was Antonius van Leeuwenhoek. He had absolutely no scientific training. In fact, he seems to have been some sort of small business man, although he had a considerable fortune to fall back on in hard times. Another asset he had was an intense interest in the then little-known instrument, the microscope. He even taught himself how to make fine lenses, and how to assemble his lenses into primitive microscopes. He made nearly two hundred and fifty such instruments during his long life, and, simple as they were, they were better than any others of that period.

The stolid, hard working burghers of Delft thought that van Leeuwenhoek was more than a little touched because he peeped and peered at everything imaginable with his microscopes. His interest is not to be wondered at because he was looking at many marvels in a new and tiny world.

Once, van Leeuwenhoek looked at a drop of what he thought was "clear" water. He was astounded to find a number of "wretched beasties"—as he called them—swimming about in the liquid. One of these animals, as we can tell by his further written description of it, was actually a tiny and exquisitely formed plant. Later-day scientists were to call this a "diatom," and discover its vital place in Nature.

The curious Dutchman did not, of course, realize that what he was looking at was a plant. With his low-powered instrument it is unlikely that he even made out much of the diatom's delicate, fragile beauty. In fact, it took a full one hundred and fifty years of improvements in microscopes, of hard study, and wordy battles between scientists, before the true nature of these minute specks of matter was finally resolved.

Since that time, many facts concerning the nature, life, and uses of the diatom have been established. Great progress has also been made by industrial research workers in putting the dead remains of these microscopic bits of life to work for us. Although the diatom plays a remarkably interesting and important role during its short lifetime, this delicate plant has a record as a hard worker that is scarcely surpassed by any other form of vegetable or animal life in the entire world.

A diatom is a single-celled plant closely related to the Algae. It is familiar to everyone who has ever been exposed to high school botany. To make out all the minute details of a diatom's structure requires a microscope of fairly high resolving power. In fact, diatoms are so tiny that the number of them necessary to fill the space of only one cubic inch is counted in the billions. And a billion is a lot of anything, even in these days of astronomical finance.

A deposit of diatomaceous silica or earth found near Terrebonne, Oregon. Laid down in very ancient times, this ledge is nearly white in color and notable for the purity of the "crude" material. The diatom earth is bulky but not heavy, so trucks with specially large bodies are used at the mine or quarry.

PHOTOGRAPH COURTESY OF THE DICALITE COMPANY

These tiny plants produce a liquid composed of pure silica. The liquid hardens and forms a protective coating all around each of the individual plants. The covering takes the form of a crystalline, glass-like box—for glass itself is composed mainly of sand, and sand, in turn, is silica. The diatom's box is in two separate parts. One part laps snugly over the other half like two sections of a pill box. The two halves of a diatom covering are fastened together with a sort of elastic belt that allows the plant to grow during its lifetime.

The shell covering is so thin and strong that the diatom can float about in water. Since this glassy covering will not permit any water to seep through to the plant growing inside, the box-like shell is pierced by minute pores that enable the diatom to absorb both food and water. The diatom stores up its food—*not* as starch or sugar, as other plants do, but in the form of drops of oil. Numerous scientists have come to the conclusion that we owe many of our petroleum deposits to the industry of the hard-working diatoms.

The shells that encase the diatoms are ridged and molded in an infinite variety of ways, giving strength to the structure. The designs of the transparent structures are so beautiful, when seen under a microscope, that enthusiastic diatom students have called these forms of life "Jewels of the Vegetable Kingdom." Experts have classified more than 10,000 different varieties of diatoms—each individual variety differing from all others in size, shape, and shell design.

The life of the average diatom is extremely short, from a few days to a week at the longest. During that time, however, one diatom will produce a number of others by the simply process of "multiplication by division." That is, the diatom splits itself into two equal parts, just as do many other one-celled plants. These microscopic bits of life are to be found all around us; in every roadside puddle, as well as in rivers, lakes, and oceans. There are undoubtedly a few diatoms in each glass of water you drink.

When a diatom dies, its shell—which is practically indestructible—drops to the bottom of the body of water wherein the plant has spent its life. It joins the countless billions of diatom shells already there. In time, this process builds up a considerable deposit of the tiny shells. The deposits of diatoms, called diatomaceous silica or earth, as it is mined today, are one of man's heritages from the Miocene Age. Nature was occupied for many millions of years in accumulating the deposits.

There is evidence of violent earth movements in that prehistoric period, particularly on the western coast of our country. From this evidence, it would seem that the plant and animal life within range of this prehistoric activity would have little chance for survival. The diatom, however, seems to have thrived, rather than been retarded or destroyed.

The numerous lakes formed during the Miocene Age, as well as the sea waters of that time, appear to have contained a greater-than-normal amount of silica in solution, probably as a result of volcanic activity. So it was that the diatoms flourished and multiplied as never before, or since. To this condition, then, we owe the vast deposits of diatomaceous earth that we have today. All except minute traces of other substances have disappeared, and the present ma-

erial is practically pure silica, shapeless in nature ather than crystalline.

Today, men take "white gold" from the diatomaceous deposits. In Nevada there is an entire mountain of diatomaceous earth, locally known as "Toothpower Mountain." Many million pounds of the material have been removed, with little apparent decrease in the bulk of the mountain. Another deposit in California occupies an area of five square miles and extends downwards for more than fourteen hundred feet. It contains more than one hundred million tons of diatomaceous material, so one may calculate how many individual diatom shells are present, where several billion are required to make one cubic inch!

The crude diatomaceous earth is removed from the deposits by quarrying, or, as it is frequently termed, "open pit mining." Varying thicknesses of "overburden," of course, must first be removed in order to reach the pure material. The ancient Romans were well acquainted with this method of obtaining diatomaceous earth, and they also knew many uses for it.

A cube of this material, one foot on each side, will weigh about eight pounds. The same volume of water weighs more than sixty pounds. So a block of diatom earth will easily float, and the Romans referred to such pieces as "floating bricks" and "swimming stones." Diatom earth has little strength, and is now never used for building bricks. The Romans, however, employed them in construction when they wanted light-weight masonry for certain buildings.

Much of the diatomaceous earth used today is quarried with power shovels. Since the uses of the material depend a great deal on the preservation of its original structure, however, hand quarrying is also used when extra-careful handling and selection of material are required. The material is classified as to density, structure, and other characteristics and is then sent to the mill, where it is dried and otherwise processed.

Little commercial use was made of this shell-earth until 1870. Then it was that Alfred Nobel, of Nobel Prize fame, made dynamite by soaking sticks of diatomaceous earth in nitro-glycerine. This one invention would have been enough to make diatoms famous, because dynamite has been responsible for much of the large scale mining, railroad construction, and building in our country during the past sixty or seventy years.

The uses of diatoms are not confined to this one field, however, for modern industrial research engineers have probed deep into their possibilities.

As can be seen from a microscopic view of this tiny vegetable, a single diatom has a very intricate design made up of extremely delicate lines. Microscope workers—biologists, chemists, metallurgists, and others—have found that single diatoms are valuable for testing the quality of expensive, high-powered microscope lenses. A good lens will show the lines on a diatom shell sharply and clearly; a poor lens will cause these lines to blur and appear to run together.

Another use that chemists have found for diato-

PHOTOGRAPH COURTESY OF THE DICALITE COMPANY

Air view of the plant and part of the diatomaceous earth deposit near Torrance, California. This is a marine deposit, whereas the ledge shown on the opposite page is one that was built up in past times by fresh-water diatoms. Fossil fish remains, believed to be more than four million years old, have been found.

maceous earth is in the handling of the large glass bottles called "carboys," in which strong acids are shipped. These bottles are packed in crates, surrounded with powdered diatom material. If the glass bottle is broken during shipping, the shell-earth, which is very absorbent, will soak and hold all the acid, thereby preventing the spilled liquid from doing any damage.

If you have the opportunity to examine a diatom under a good microscope, you will notice that the shells all have a file-like surface. This fact gave researchers another idea. If you want to remove rust from iron, you can use either a file or sandpaper. But when expensive silverware and silver plate become tarnished, it must be polished so that the tarnish and stains will be removed, but the silver itself will not be marred. So in most kitchens today there is a jar "full of diatoms"—actually, silver polish made from diatomaceous paste.

A much more important use for diatom earth is in sugar refineries. When sugar is extracted from the cane, it is in a water solution, or syrup. This syrup must be strained through cloth to filter out any impurities. The sediment in the syrup soon clogs the filter, halting the process to change cloths, thus delaying matters.

PHOTOGRAPH FROM THE DICALITE COMPANY

Diatoms of the needle-shaped type, which is a structure highly valued for use in the manufacture of "filteraids."

In modern sugar refineries, a little diatom earth is added to the sugar syrup. When *this* solution is put through the filter, the microscopic diatoms pile up on the cloth, and the fine shells catch and hold the dirt. As more of the sugar syrup is poured in, more shells fall to the bottom, and so on during the entire process. There is no hard cake of dirt forming against the cloth to slow up the filtering.

Diatoms added to paint make it last longer. The ridges of the shells lock together as the paint dries, forming a hard, thin film that will neither crack nor peel. Added to dry cement powder, diatoms have much the same effect, making the finished concrete materially harder and stronger. This is another case of many small forces all working together to produce a better result.

When shell-earth is mixed with fine asbestos fibers, the resulting material forms an excellent insulating material for modern homes. Stuffed between the walls of a house, the material keeps the interior cool in summer and warm in winter, cutting down street noises.

Diatomaceous earth is an important "filler" material, being particularly useful when mixed with asphalt. The resultant asphalt-diatom substances have a much higher softening point and less susceptibility to heat than plain asphalt. The mixture is also more flexible and less liable to crack at low temperatures; stronger and tougher than plain asphalt.

Diatoms have a splendid war record. For instance, diatomaceous earth was used in the "filteraids" employed in purifying drinking and cooking water for our armed forces overseas. Mobile water-purifying equipment was designed that would take up water found anywhere, and make it safe for drinking within a few minutes. The water was treated chemically and then filtered. The filtration was so "sharp" that it effectively removed not only cysts of amoebic dysentery, but also filtered off the blood flukes prevalent in Philippine waters.

Diatomaceous earth filteraids were also used in many ways for production of war materials such as penicillin, fat and oil products, lubricating oils, and many food products.

Still another important wartime use of diatoms, requiring many hundreds of tons of material, was as a "flatting" agent in camouflage paints, enamels, and lacquers, as well as in flat finishes used on all kinds of military equipment. A flat finish, incidentally, is one that has little or no gloss. A flat finish is desirable because it does not reflect light and so betray positions to the enemy. Camouflage paints were used in tremendous quantities.

All in all, diatom materials were so important that they were assigned top priority among the non-metallic materials, and at one time were practically on allocation by the War Production Board.

The uses to which diatoms are now being put run literally into the hundreds. They pop up in all sorts of unexpected places. They are used in making soaps and cosmetics; in the manufacture of ink; as "filler" materials; to improve the quality of paper, and in many other ways.

Thus has the trained, disciplined imagination of the industrial engineer taken advantage of the peculiar properties and structure of the diatom. Forty years ago, people knew little about this particular form of life. They were useful mainly in biology classes as something interesting to study with a microscope. Today, these tiny, fragile shells form the foundation of many thriving and important industries.

Bird Greens

By W. L. McATEE

BIRDS use greens in much the same way as we do for food, medicine, and decoration. Green leaves, or pieces of them, are probably swallowed at some time or other by all birds. Much of this may be incidental, or accidental, but again much of it is purposeful and practical. The upland game birds, grouse, quails, and partridges, eat a great deal of green food, the introduced gray partridge being very fond of it, and the native sage grouse subsisting largely upon the foliage of the plants for which it is named, the sagebrushes.

In this field, as in many others, names accurately reflect habits. Thus the duckweeds, green disks or granules floating on quiet waters, are important food for wild fowl, especially the young. Other plants named for their value to waterfowl include: brant salad (some of the marine algae), duck celery (more commonly known as wild celery), and duck lettuce (a kind of salt bush). Under the terms duck grass and goose grass go a variety of plants, of both the water and the land, that are notably patronized by the birds for which they are named. Among greens of dry-land growth and use are the chickweeds, henbits, and bird peppers. By the last word I refer to the shepherd's purse—a true green—not to the peppers, red when ripe, that are eaten by people as well as by birds.

Starlings were observed to keep a single leaf of yarrow on the edge of their nests. Only yarrow was used, and, since the leaves were always fresh, apparently had been renewed.

Hawkbit or hawkweed, names of long interest to me, turn the trend of thought to medication, for, so far as I have been able to trace their meanings, one of them arose from the use of these plants in falconry to make a hawk cast its gorge, that is, relieve itself of a pellet, the disgorgement of which was overdue. This is man's dosing of captive birds, but apparently wild birds do some "doctoring" on their own account. And why not? Dogs and cats chew and swallow grass blades, although difficult for them to manage, and it is commonly assumed that this is for riddance of worms, or for some other self-healing. Loose balls of grass have been found in the stomachs of nestling robins, and, as these birdlets could not have obtained this material for themselves, they must have been given the grass "pills" by their parents. That looks like "doctoring."

An old record in this field gleaned from Samuel Clarke's *A Mirrour or Looking-glass both for Saints and Sinners*, 1671, reads as follows: "In the Isle of Man, there is a sort of Sea-Fowles called *Puffins* . . . they nourish their young (as it is conceived) with Oil drawn from their own bodyes, and dropped into their mouths; for that being opened, there is found in their crops no other sustenance, save a single Sorrel-leaf, which the old give their young (as it is conjectured for digestion-sake)" (p. 24). Other ancient European accounts aver that stockdoves, jays, merles, and blackbirds use laurel (sweet bay) to recover their appetites. We read also that plantain is both bread and medicine to the cuckoo.

There is extensive ancient lore about the use of herbs by birds to cause the eyes of the young to open. Some birds, as the waterfowl, shore birds, and upland game, hatch ready for active life as soon as dry, but many true-nest and hole inhabitants, as the doves, owls, hawks, cuckoos, kingfishers, woodpeckers, and songbirds, are born blind, the eyes not opening for some days. Evidently this helpless condition once was looked upon as a malady needing curing.

Men observed that some of these birds carried green

Larkspur was associated with the lark because it was thought to be carried to the nest to bring sight to the nestlings which are born blind.

plants to their nests and jumped to the conclusion that these were medicinal herbs to relieve the blindness of the nestlings. The so-called "reasoning animal" is not satisfied unless he has "reasons" for everything, spurious though many of them may be. A fact without a reason attached is a ghost in his intellectual attic, but one that can be laid by a duly accepted "reason."

So there grew a code as to eye medication by birds, specific herbs being deemed as used by certain birds to bring the boon of sight to their offspring. Thus the swallows' herb, or swallow-wort, was celandine, a spring-blooming plant of the poppy family that is freely naturalized in the northeastern United States. Goldfinches and linnets were said to employ eyebright and rue. The eagle used wild lettuce; the raven sweet bay; the ring dove marjoram; the lark the larkspur, and so on.

There was some mixture as to birds and plants, but, on the whole, there was surprisingly general agreement over wide areas in Europe as to the vision-bringer preferred by each kind of bird. This indicates that the birds actually brought certain plants to their nests, and therein, so far as it is true, lies the mystery.

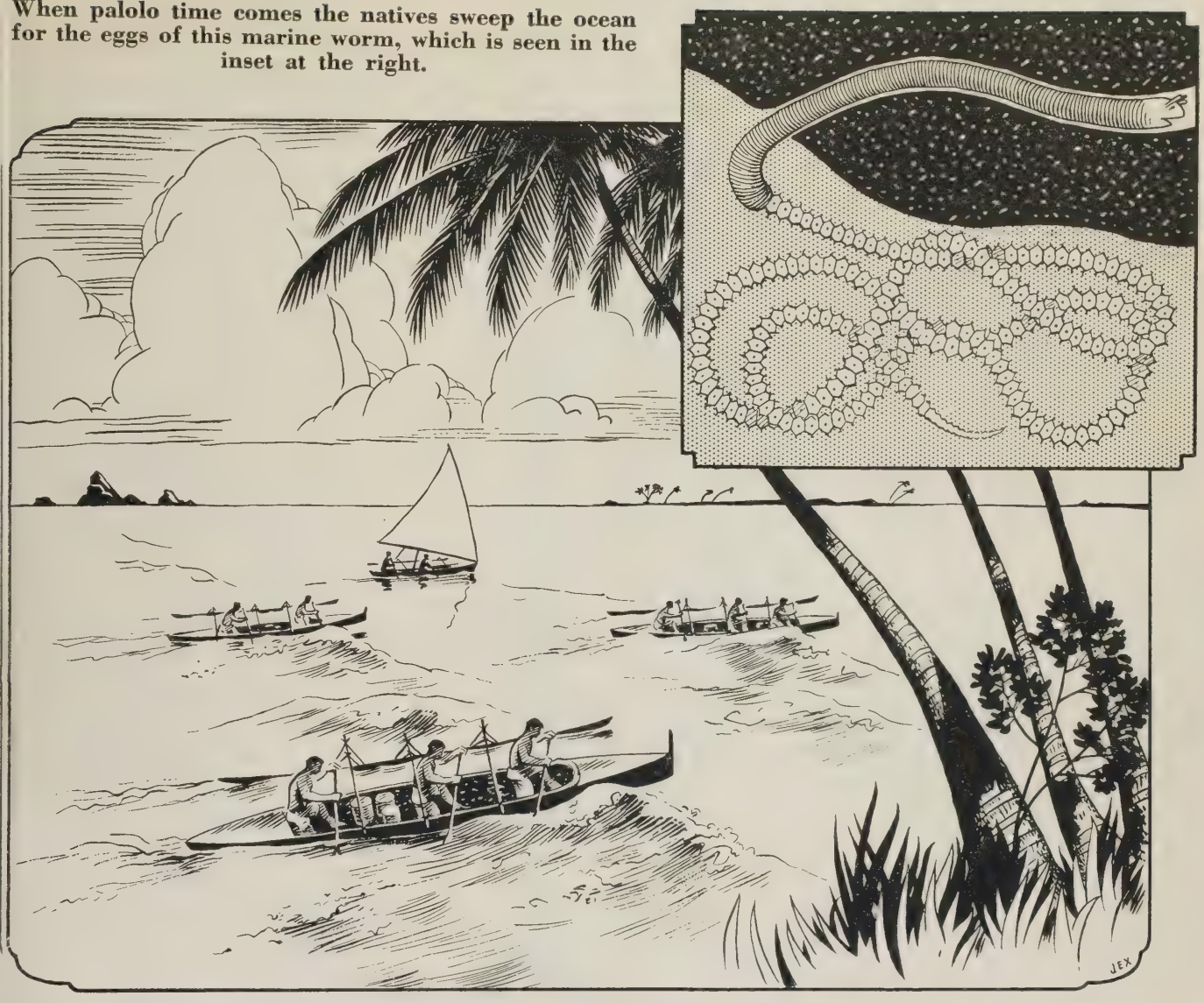
Why should a bird select a definite kind of herb to bring to its nest? I am prepared to believe that some of them do so from my experience with the starling. In bird-box studies at Bell, Maryland, 1926-1931, it was observed that most starlings kept a single leaf of yarrow on the edge of the nest. In the dim interior of the nest box, this surely could not be well seen, but only yarrow was used, and, as the leaves were always fresh, they must have been renewed. Yarrow has a strong smell as well as medicinal virtues, and it is thought to be the plant with which, according to the ancient tale, Achilles cured the wounds of his soldiers. But what use the starling has for it is a question. Sanitation it is not, for the yarrow leaf was always single, and a hundred such leaves would have been needed to remedy the excessive foulness of the average starling nest. Being laid on the topmost edge of the nest and being kept ever green, decoration seems the most likely motive—but decoration in the dark? How doubts assail us!

Nest sanitation, however, clearly seems to be the motive of some of the use of greens by birds. The groove-billed ani, a notoriously crude nester, sometimes replenishes the lining of its nest with green leaves. Certain fish-eating birds, such as the anhinga, cormorant, blue heron, and white ibis, are reported to use fresh leaves for nest linings. Edith Coleman (from whose writings various bits in this summary have been gleaned) records the use in Australia of tea-tree leaves by the yellow robin, and those of *Lasiandra* by the song thrush, as a kind of removable bedding to soak up or cover excrement. She found English sparrows putting leaves of Canary Islands pyrethrum in their nests, perhaps as an insect repellent. It is conceivable that other strongly scented greens may have that effect, whether or not intended.

Greens as the main building material are used by the yellow-bellied flycatcher (mosses) and the orchard oriole (grasses). It is of interest that the latter bird's home, woven of green grasses, although protectively colored at first, becomes conspicuous in a green tree as the grass cures, becoming "straw."

Students of the nests of birds customarily refer to ornamentation, and they may be right as to the intent of the birds as well as to the reaction of the human observer. Nests of the wood pewee and of various hummingbirds are beautiful structures, in part from being "stuccoed" with lichens. Bent and Townsend reported nests of cormorants on Seal Rock, Labrador, as "decorated" with green sprigs of fir, spruce, cedar, or laurel, brought from the mainland several miles away. Various hawks, including the osprey and bald eagle, are known to add evergreen sprays to their nests. These are decorative from our point of view, and probably, also, from those of the birds'. Of all uses of greens, this—for an esthetic reason—would seem to rank as highest in an evolutionary scale.

When palolo time comes the natives sweep the ocean for the eggs of this marine worm, which is seen in the inset at the right.



A Palolo Feast on Samoa

By ARDIS EDWARDS BURTON

Illustrated by Garnet Jex

With food sometimes hard to find in the market, and harder to be paid for; with price control a thing of the past and crops variable; with foreign commitments cutting deeply into our stores, quantity, quality, and variety in meals is often a problem. Even the old stand-by, pot-roast, is costly.

This is the time, then, to share Nature's less common delicacies—at least on the printed page, if not on your own table. How about a palolo-egg roast on the shores of Samoa in the South Seas.

Tropical seas, in shallower depths, abound in fantastic plants and animals. Such unheard-of shapes and colors are everywhere that it is like a different world. There are sponges, corals, crustaceans, worms.

Among these are the marine worms, with feathery fans, lacy tentacles, plume-like bristles, or, sometimes, a portable hollow tube in which to hide. The palolo worm, *Eunice viridis*, is related to these strange creatures.

Eunice is no great beauty, but her life is full of secrets and mystery. She is about three inches long, and has only a few short bristles on her slim, segmented body, and the plainest of utilitarian "feelers" on her head. A home girl at heart, she remains secluded in a crevice in the corals at the bottom of the sea, where she burrows into the rock to avoid "the claws that clutch, the jaws that snatch."

A sedentary life arouses in her no voracious appetite, and she is quite content to take what comes to her in the way of food from the microscopic particles in the sea. Or, failing to find enough thus, she timidly backs out of her burrow, lacking the neces-

sity—or the courage—to venture far in search of food.

Her sole occupation is producing, at her posterior, a part of her body several times as long as herself, which resembles a string of beads, containing eggs. This she accomplishes once a year. Poor Eunice herself may have a dull time, but the part she generates—her alter ego—contains the mysteries of her sex life, and, indeed, the future of her race. She has no responsibility, no knowledge, and no part in its joys and fears. For this rear section, when it is "ripe", breaks away, leaving Eunice in her burrow puzzzled over what became of the large and cumbersome part to which she had become accustomed. Nothing daunted by its loss, she begins at once to generate another, which will be completed at exactly this same time next year.

So we leave Eunice to the job that she does not understand, and follow her more interesting alter ego.

After becoming loose from her body, the chain of eggs rises to the surface of the sea. At the same time there are countless millions of palolo worms, male and female, doing the same thing, until the whole sea looks like spaghetti soup. When the individual sexual segments burst, eggs and sperms are released, and give a milky look to the water. Such eggs as are fertilized sink to the bottom to mature. But here is where the Samoans come in—and you, too, if you are interested in a food of great delicacy.

The Samoans long ago became familiar with the ways of the palolo. And they learned what a delicious dish these eggs make, wrapped in leaves and roasted in the steam, flavored with cassava roots. And they learned the most amazing thing about the palolo worm—the release of the eggs at dawn, exactly one week after the full moon in November.

For days they prepare for the feast, as we stock up the pantry the week before Thanksgiving. Women, old men, and children stay on shore, and only the strong and the young will man the out-rigger canoes. It is a trip of a day or two out to sea, to await the appearance of the palolos.

Not the best oarsmen, but most anybody, can row the out-rigger canoes out to the scene where the eggs swarm to the surface. But the return voyage is a race to the strong and the swift. Only the best compete here, for it is honor and a trophy to him who is first to reach the land with his buckets of palolo eggs.

Some of the boys crouch in the canoes, holding the precious buckets lest they spill the eggs. Skimming over the tropical sea so the eggs will arrive fresh, the out-rigger canoes speed home. And on the shore families and friends cheer wildly while the fires blaze in preparation for the feast.

As clams are roasted in New England, the palolo eggs are roasted in the coral rocks, under the fire. The Samoans gorge themselves, much as many of us do on Thanksgiving day, for they know that another feast like this will not come for another full year.

★

"Two in the Bush"

By MABEL IRENE HUGGINS

ORNITHOLOGISTS and members of bird societies are not the only folk who have made people bird-conscious. Poets and song-makers have also done their share. Here are 17 quotations from well-known writers. For each there is a two-part answer. (1) Identify the bird which is mentioned in the context, and (2) give the source of the quotation. Each part counts a score of three, thus making it possible to reach a mark of 102. Anyone who attains that figure has a right to the degree P. P. (PROUD as a PEACOCK). See page 164 for the answers to this literary-ornithology quiz.

1. "Then the bird said, 'Nevermore.' "
2. ..... "at heaven's gate sings,"
3. "Near to the nest of his little dame,"
4. ..... "secretly builds on the watery sod,"
5. ..... "whose echo resounds through the glen,"
6. ..... "he sings each song twice over,"
7. "Singest of summer in full-throated ease."
8. "In a cowslip's bell I lie;
   There I couch when" .....
9. "Happy as de day am long."
10. ..... "the Shuh-shuh-gah,
    Feeds among the reeds and rushes."
11. "While the ....., with lively din,
    Scatters the rear of darkness thin,"
12. ..... " a nest for herself, where she may lay her Young," .....
13. "The blue deep thou wingest,
    And singing still dost soar, and soaring ever singest."
14. "For all averred I had kill'd the bird
    That made the breeze to blow."
15. ..... " 'You elegant fowl,
    How charmingly sweet you sing!' "
16. "And nipped off her nose."
17. " 'Is it weakness of intellect, Birdie?' I cried,
    'Or a rather tough worm in your little inside?' "

Robins in White

By H. ROY IVOR

Photographs by Hugh M. Halliday

THEY are as white as newly fallen snow—Papeck, Weewee and Cherilee. The true, full albino—pink eyes, yellow bill and legs—is one of Nature's rarities. But these three are not rare only—they are one of Nature's wonders. So far as it has been possible to ascertain, there is no other record of three albino song-birds and a partial albino in one nest, and, more, the nest of normally colored parents.

An almost unbelievable telephone message came to me one day in June: "Can you come to Meadowvale at once? There are three white young in one of our robin's nests, getting ready to leave. Now, there is one on the ground. Hurry!" I hurried. When I arrived, all four nestlings had left the nest and had been gathered into a cage. Here, with care, was a rare opportunity for future study in albinism. Also, because an albino has comparatively poor eyesight and thus a slim chance of survival in the wild, their lives might be greatly lengthened by protecting them.

Jean Fogg of Erindale, Ontario, Canada, provides a perching place for Papeek, Weewee and Cherilee. This photograph was taken on the day that the birds arrived at the author's aviary. They were then about fourteen days old. They are all pure albinos and the dark spot on the wing of the bird on Miss Fogg's shoulder is shadow. At the left is Papeek as an adult in October.

The three birds photographed on the last day on which they took food from the food stick. Thereafter they foraged for themselves and were quite successful at it.

The fourth youngster, the partial albino, with the three pure white ones, should, in the future, furnish a remarkable and exceptional opportunity for study, but sometimes even an amateur scientist must allow for parental emotions. So the little partly white fellow was given back to the father and mother.

After being safely brought to their future home, we assumed that they would be, like all baby birds, starving. If they were, they did not admit it. Of all the stubborn avian youngsters with which I have had to deal, these were surely the worst. No gaping yellow mouth greeted me when I offered food. Instead, the food-stick had to be forced between obstinately shut beaks, each mouthful a struggle. Every half hour, for one whole long day, the three fought the food-stick. Then two learned what it meant; gave in to allure of delicious food; gaped when I called. Not the third. He did not like me, or the food-stick, or the food. For four full days he held out, then, suddenly, accepted the inevitable and dined well.

Soon the food-stick had no more attraction. Gradually it came to them that the food jar was there always, while the food-stick was not. The strenuous days were over for me, but not for the birds, however. Natural robin pugnacity had not been eliminated along with the color pigment. Yet, with all their scrapping, it is, perhaps, only youthful play. At times I see one or the other dodging and gyrating behind an arborvitae all by itself.

Will they breed? If so, will their progeny be albinos? One at least must be a male, for he sang, in his juvenile voice, every day throughout the winter. Usually, it seems, albinos are females. Yet if one is a male, biologists say, and if they rear young, all should be albinos. So far as we know, no one ever before has had an opportunity to experiment with a pair of albino song-birds. The coming spring should tell, and there may be a sequel to this present story.

★

Night Music

By BETH L. PASKO

Songs of mockingbirds
Cut the velvet pile of night
Into ecstasies.

Monuments of Monument Valley, Arizona. These are plateau remnants that are dramatic reminders of ancient plain levels. They strikingly illustrate the desert's peculiar type of weathering.

Architecture of the Desert

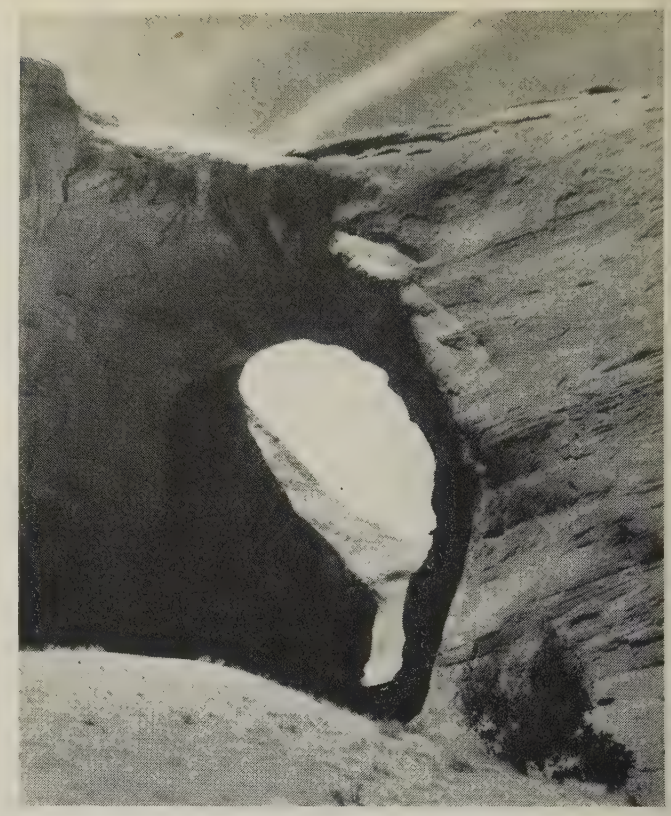
By JOHN LINDSEY BLACKFORD

HIGH over precipitous-walled, boulder-strewn washes, natural rock bridges arch slender bows of red sandstone to span the Southwest's arrancas and canyons. Cyclopean arches rise dizzily ver cliff-dweller cities perched within lofty caverns. Vindow rocks frame piled clouds and azure sky of ie wastelands. These are but glimpses of the mighty rchitecture with which Nature has endowed the esert.

Throughout the boundless primitive areas of south-rn Utah and northern Arizona, natural bridges are prodigally distributed as to become almost antici-ated features of the landscape. Kachinea, Owa-omo, and Sipapu are bows of 186 to 261 feet. hirty have been counted in Monument Valley. ainbow Bridge throws its symmetrical, salmon-pink rch over an unrivalled span of 309 feet to unite the gged walls of its stony gorge. And there may be hers yet unknown!

By guarding such secrets the desert never lets us rget. As for me, I must go back to search for those stant "red bridges" whose existence was confided to e by a lean-visaged Navajo. I remember his wistful smile—one of long remembrance, while sand-burdened wind unbraided black hair to whip about his coppery features. He had discovered the rocky spans himself, he assured me, but had not seen their ponderous red arches since herding his nomadic sheep as a boy.

The scientific explanation of such fantastic features of the desert, however, is not far to seek. It lies in the nature of the surface formations, commonly sandstones of nearly uniform texture, often crossbedded, and of remarkable thickness. The wide-ranging Navajo and Entrada Sandstones, subjected to wind-sculpture, stream-cutting, and desert weathering, have proved ideal mediums for the carving of all these fascinating landmarks. In Zion Canyon the Navajo shows its tendency to shell away along curved and oblique bedding planes and parting joints, leaving in the sheer walls great inset arches of almost gothic design. Windows in the scenic tunnel that pierces Zion's eastern wall afford close-ups of this grand architecture. And it is from this same massive, Jurassic red bed of the Colorado Plateau, formed mostly from solidified dune sands, that Rainbow Bridge's



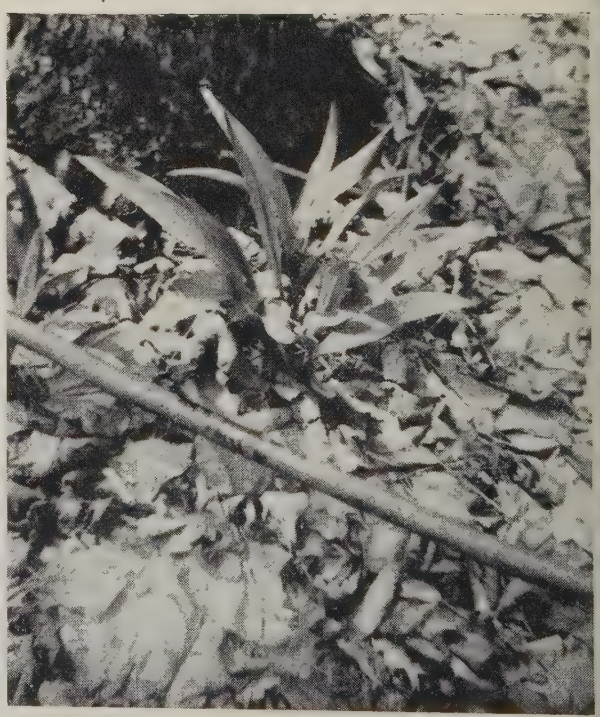
A natural bridge in massive sandstone on the Western Navajo Indian Reservation, Arizona. Note the distinctive crossbedding clearly evident in this formation, which is composed of solidified dune sands.

matchless span has been hewn by Nature's hand.

Other unique surface forms derive from the peculiar conditions established or promoted by arid climate. The desert's face is recurrently presented to us in sharp, angular profile, for here disintegration rather than decomposition of the rocks holds sway. Mesas, buttes, and serrate ridges, that would quickly lose distinctive outlines in a humid region, perpetually dominate and rim the vast, arid, intermont troughs and basins. Plateau remnants, rising with vertical walls from seas of sand and rubble, cap flat-topped summits with resistant layers. Their uniform elevations, when projected across the vast gaps of intervening flat-floored basins, dramatically contrast ancient plain levels with present peneplaning. Sentinel and pedestal rocks rise in grotesque and startling silhouettes—similar reminders of slowly departing landscapes. Fault scarps maintain prominent, youthful cliffs to tell the story of their displaced strata. The red fire flung from glowing mesa walls, the step-like cliffs of rocky gates that lead on into the smouldering sunset, the high rimrock that plunges precipitously off into painted canyons—these too are among the wondrous effects unusual land forms create throughout the ever-alluring enchanted Southwest.

Wild Leek

By MARIE BARLOW BUCKMAN



WHEN THE soft winds of spring begin to blow, it is time to tap the giant maple trees. Snow is melting, and as soon as the sun touches brown patches of earth tiny green shoots appear. These are wild leeks, *Allium tricoccum*, first to show their leaves in spring. By mid-April the ground will be carpeted with their rich, shiny, green leaves. Later these leaves will wither and drop, and then a naked scape will arise, bearing the greenish-white flowers and, later, the smooth black seeds.

The leeks belong to the onion family and are strongly-scented. They grow from a fibrous-coated bulb, and these bulbs were prized by the Indians for food and medicine. The Chippewas tell a legend of the sa-ga-ga-winj, or wild onion.

Once Winobojo the great Chippewa hero traveled to visit various eastern tribes. At one village he was welcomed at a great feast, and the food was well flavored. Winobojo asked what gave the venison such a fine savor, but was told it was a secret handed down from generation to generation of tribal cooks. Then, one day, he saw some of the squaws going towards the hardwoods with bark baskets, and he resolved to follow them to see what they sought. He crept through the bushes after them and saw them digging small white bulbs from the ground. One squaw left her basket for a few minutes, and Winobjo crept up and stole some of the small bulbs. The squaws saw him, however, and set up a fearful hue and cry, so that he had to run swiftly to get away. He managed to escape and brought the small white bulbs back to the Chippewas. And to this day the tribe seasons their food with the sa-ga-ga-winj, or wild onion.

Oregon's Vertical Park

By HAROLD OLSON

Oregon folks proudly call this Sequoia, in its ten-by-fifteen-foot bed in one of Salem's streets, the smallest forest park in the world. At the end of the tree-shaded avenue is Oregon's new State Capitol.

SMALL but arresting is an Oregon memorial to its service men—Sequoia Park in Salem. It may be the tiniest park in the nation, but its bulk and spiritual stature should grow for a thousand years or two, for it bears one of Nature's amazing pylons that can outlive marble edifices—a *Sequoia gigantea.*

This unique park is becoming somewhat of a celebrated oddity in the nation's leading forest state. Right smack in a street near the magnificent new state capitol is the lone-tree park. Its surface area is only ten by fifteen feet, of which more than half is already preempted by tree trunk and deploying roots. In its own right the tree is an object of some awe because it has been "imported" to that land of tall forests and prolific tree farms. A bronze marker, a traffic barrier, tree and 150 square feet of real estate—that is all there is to Sequoia Park.

There is some documented history behind the 75-year-old Bigtree. In 1872 a peddler brought a sprout from California. William Waldo, who, as a lad of eleven, had trekked from Missouri to Salem in 1843 with a wagon train, planted it in his acreage tract at the outskirts of Salem. It grew with Oregon's capital city. Came the civil engineers with their transits. They laid Summer Street right through Judge Waldo's tree. He would not let it be cut.

Summer Street became the early-day Pacific highway there, and the tree became an obstruction to progress. Maybe wagon hubs rubbed the bark. Maybe brassy Model-T's bounced on its roots and drivers grumbled. But somehow the tree stood inviolate. Two municipal moves to clear the street, with plenty of official steam behind them, were quashed by civic pressure. Eventually a new highway route was opened a few blocks away and Summer Street reverted to a residential artery only, which it is today. On June 15, 1936, the city council, by resolution, made the tree a park and gave it a piece of street as abode. Salem chapter of the American War Mothers dedicated it to the honor roll of the services and raised a tablet with this simple inscription:

"This tree planted 1872 by William Waldo, a pioneer of 1843. American War Mothers."

Today the Sequoia stands 96 feet, and measures five feet, two inches in diameter, breast high. At the ground the trunk exceeds six feet, tapering sharply. Branches are massive, foliage luxuriant, root system stout, bark a mirror of redwood health. Not a single traffic scar, nary a kid's carving, mars the prime outer coat. All indications are that the tree, still a babe as Bigtrees go, is just entering its real growing stages.

Oregon's forest-conscious folk point with pride to this dated tree as living testimony of how trees do grow. Sometimes they find people forgetting that sprouts get big with the years and become timber. They find great pleasure in showing off this tree. "Why, it's growing right out of its crib," say they. "Pretty soon the park will be all forest, all wood up to that Oregon mist that makes trees grow so fast out here. Then our friends on the city council will have to give this tree another bite out of the street."

Otter Adventures

By HUGO H. SCHRODER

Photographs by the Author

So elusive is the otter that it is rarely seen, since it dives at the approach of humans and swims under water to a safer place. This one, however, was found in thick grasses and when the water was low, and was restrained long enough to be photographed. The animal was not too willing as a subject, and it was impossible to get a picture of it out of the water. He was given his freedom after this reluctant posing.

After having seen the amazing speed with which otters are able to move about in the water, I never would have believed that it could be possible for one man to corral a wild otter in its native habitat. Consequently, when I answered the come-on signals of my companion from a marshy pond about 150 yards distant, I was greatly surprised to discover that he had been able to restrain the movements of an otter long enough for me to reach the scene with my camera. When my friend spotted the otter, it made a determined effort to escape, but its escape was foiled by a dense growth of grasses and other vegetation in the marsh. The water level of the marsh had been considerably lowered by a prolonged spell of dry weather. This kept the otter from diving and swimming away.

It was the afternoon of a warm spring day in the Kissimmee Prairie region of south-central Florida. My companion had decided to explore a large marshy pond. I remained in the car to rest after a rather strenuous day afield. There was a strong wind blowing, which prevented me from hearing my friend's calls informing me of his find. Had it not been for his persistence in trying to attract my attention, I would have lost my only opportunity of photographing a wild otter in its native habitat. However, I finally saw his frantic signals. Sensing that he had something unusual, I grabbed my Graflex and Rolleiflex—the latter loaded with color film—and waded into the marsh.

While the shallow water and grassy cover had made it possible to prevent the otter from escaping, there was still sufficient water present for the animal to keep most of its body submerged. The growth of grass was so dense that it was difficult to obtain photographs of the water-loving animal.

In our wanderings in the Florida wilds we carry light sticks that come in handy for various purposes. In marshes and swamplands, cotton-mouth moccasins are frequently encountered; therefore a good stick is a handy weapon to have when these reptiles are met at close range; also, the stick makes a good support when wading in water while carrying cameras and other photo equipment. In this case our sticks were useful in heading off the otter's efforts to escape, and to push away some of the grasses that kept bobbing up in front of the animal. Unfortunately the otter thought we intended to use the sticks for other purposes, and, naturally, tried to leave when a stick came too close to his face. However, he never offered to grab at it, although he occasionally uttered a sort of sneezing "woof", as if to say he did not like it. Every time he changed position we had to rearrange the intervening grasses. Seldom was it possible to have a clear view long enough to get a picture. It was a case of shooting regardless of grass

Revealing a bit more of its anatomy, the otter watches the photographer with evident distrust, a quizzical and questioning eye turned in the direction of the camera.

stems in the way. Such are photographers' problems.

Observing and filming a truly wild otter at such close range was an interesting photographic adventure—one of those once-in-a-while experiences that occasionally happen for the wildlife photographer. Needless to say, I used up the remainder of the film pack in my Graflex, and shot a half-dozen Kodachrome films in the Rolleiflex, before we allowed Mr. Otter to depart.

In all the years I have wandered about in the Florida prairie regions, where the otters inhabit the numerous marshy ponds, this was my first encounter with one of these animals. Ordinarily they submerge quickly when they sight a person approaching in the marsh, swimming a considerable distance before they come up for air in a far section of the swamp. Unless the swimming creature is observed before it disappears beneath the surface, one would be entirely unaware of its presence.

My companion on this trip has had a considerably longer acquaintance with the Florida prairies, being a native of Florida, yet he has observed otters only on rare occasions. Once he was able to watch a pair at play in a prairie pond. The animals seemed quite oblivious of his presence. Perhaps they were having such a good time at play that they were unconcerned about being watched.

Otters greatly enjoy their playful moments. In zoos they keep active by using man-made slides. In the wild state they delight in performing playful antics in the water; they chase each other as if engaged in a game of tag. If there is an earthen bank beside the water, they scamper up the incline, and slide down into the stream or pond. After a few slides the surface becomes slippery, thus facilitating the sliding. Where a rather steep bank is available, the slide may cover a distance of twenty or more feet. Clay banks are particularly desirable for slides, becoming more slippery than ordinary earthen banks. Snow slides are also used for the otter's tobogganing in northern regions. Just as small boys like to slide down hill, so do otters appreciate sliding in the snow.

Young otters make excellent pets. Some years ago I was astonished to discover two otters scampering over the canopy of a store building in Tampa, Florida. I watched them chasing each other from the

canopy to the roof and back again. The pair were pets that were allowed their freedom at times so they could get enough exercise to keep in good condition. Even though the home of the otter is in the water, it is able to travel on land quite rapidly.

The otter is an excellent fighter and has been known to whip a dog larger than himself. When kept as pets, however, otters have been known to make friends with their dog neighbors.

The streamlined body of the animal is well adapted for its life in the water. Not only is it able to swim rapidly along the surface, but it can cover a great distance while swimming under water because of its ability to remain submerged for several minutes.

Otters range from Florida to Ungava, and from California to Alaska. Even though they range over a large territory, they are not abundant anywhere, and their presence in a certain region may be known to only a few people, which is best for the otters.

★

Transcript of a Frosty Morning

By OSCAR OSTLUND

THE LATE November sunbeams, slanting at an angle which diffuses them, seem to attach themselves artistically and lovingly to the humblest forms in the upland woods. The gray tones and gaunt shapes of withered trees appear animated and beautifully contoured in the effulgent, early forenoon light. Neutral and vivid colors complement each other. The common grays stand out, transfigured, in high relief against a galvanizing blueness in the sky.

It is an hour of glory for the old, blighted chestnuts on autumn's valedictory stage. The downy woodpecker, a speaker at this jubilee, taps out a ringing address on the seasoned tree. His festive, white-flowing sash is conspicuous in the November limelight, which also accentuates the beauty surviving in the blighted chestnuts—the clean limbless trunks, which, in a bygone forest, thrust their branching tops erect and high in the ceiling of the unslashed woods; the selfsame trunks today in stately mien preserved, aloof in their repose. They stand out now as shafts of gray contoured against the gleaming blue, as rustic prototypes of Doric temple pillars, reverent in mood, aspiring skyward.

Airy wisps of vapor curl up from laurel leaves on which the rime frost is melting. The atmosphere is spicy with odors of last summer's fallen foliage; the fragrance of frosty vegetation; incense of the moist cool earth; the breath of the mountain's health.

From the clearing around my shack, at the source of Jake's Lick, I take several steps into the woods, and the urge is upon me to take a thousand more, today and tomorrow and the next. Such is the physical and spiritual draught of recreative power out of the unplumbed reserves of Nature. All weariness has been banished. The purity of frost and wind, the freshness of the earth, the glowing parchment of sky are cognate, and they correspond, in the language of heaven, to a redeeming idea in which irritations and ailments—the human heritage of cares—lose their sensation of weight, of having dominion in the conscious identity of the higher self. One vibration, one accord moves through the beautiful that is seen and through the one who sees it. Nothing is excluded. No atom of a mortal part, no nerve or cell is separated from the harmony.

While seeing hemlock branches swaying in the breeze, buoyant, eloquent; while the eye is entranced with movement absolutely beautiful in its unhurried rhythm, the ear, innocent of other sounds, hears the utterance, which ever undiminished flows from day to day, filling heaven and the earth with serene melody; with words of harmony that touch the instrument of soul.

The trees sing out at the presence of the Creator. They sing a song of which no man can have knowledge unless he be redeemed from the earth. That is to say the human, unstable, evolving earth of knowledge. While we are "at home in the body" of finite sense, we are absent from the Lord in the enlightened mood.

These words no doubt seem weak and visionary when assayed from the point-of-view of a hustling, businesslike world, with its vaunted practical sense that is being called "*realistic*" in the Big Power parlance of our day, but actually has an unenlightened sense—grasping, hard, insensitive.

In the spheres of influence where the champions of this sense rule, there is slight evidence of the amateur spirit, of a humble, loving approach to the problems of human life; a balm that only waits to be applied to a world, aching and torn apart by power-cliques mobilized under a symbol which engenders proud hatred for the symbol of another clique.

In the collective life, as in the individual's, the activating principle of a loving mood—in place of the grasping—is inseparable from evolutionary progress and from fulfillment in living.

The art of life and all the arts are static when bereft of love. It is the headspring of the beautiful; the illuminator of truth; the creator of the real.

The Little Brown Jug

By GEORGE ELWOOD JENKS
and KAY McKAY

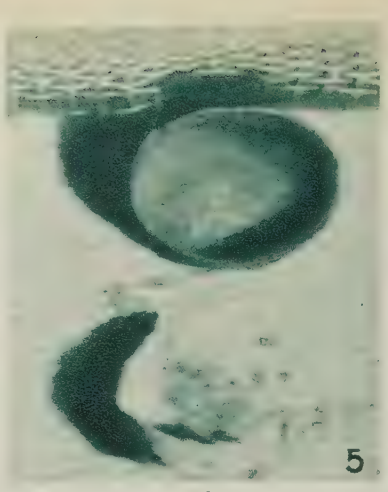
MORE than seven years ago I found my first little brown jug, cemented to the top of a dry wild oat stalk. It was a perfect miniature jug, modeled in clay and about the size of a small marble. A little yellow-and-black wasp was still workng on it, sealing it up with a stopper of clay.

Then the wasp flew away, and I never saw her again, or did I ever find another such jug-nest in Nature. But the following summer I discovered a few more of these wasps feeding upon the nectar of wild anise blossoms. So I started a small colony of them in an applebox cage with a glass front. It was late in the summer, however, and nothing happened; no jug-nests were built to provide material for study.

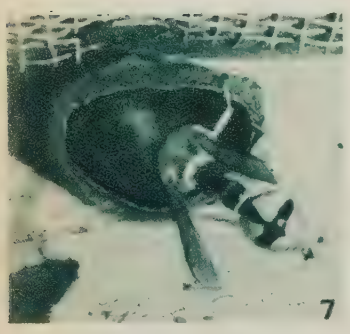
The next year I started early and was able to build up a colony of about a dozen wasps. After two or three weeks they began to feel at home in their new habitat, and two of them started to build jugs. I hoped that I would be able to obtain pictures for a complete life story, but then came tragedy. A horde of ants swarmed into the cage one night and wiped out my entire colony.

Similar face came to my wasp colony the next summer, and then came World War II. War work called me and I had to abandon any wasp investigations. But with the coming of victory I turned back to my wasp studies. So, the seventh summer after my first encounter with the jug-nest of the wild oat stalk, our luck held good. We were able to complete the story of the little brown jug and the little wasp that is such an expert at pottery. These years of trying to get the story will explain why, in the series of pictures that follow, we have used several different jug-nests in order to show clearly all of the successive stages of construction. The species presented is known as *Eumenes xanthogaster* among entomologists.

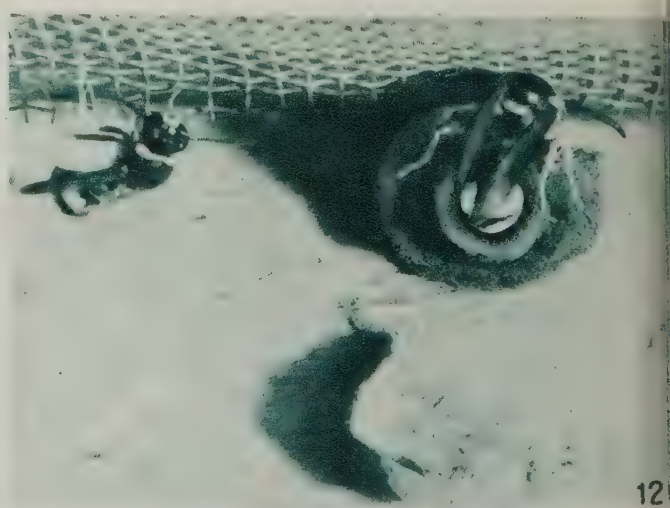
(1) The jug-nest, at the top of the page, as it is found in Nature. (2) A jug-nest as built on the ventilating screen of a large photographing cage—the laboratory home of the colony. (3) Wedding breakfast of a pair of jug or potter wasps on blossoms of wild anise.



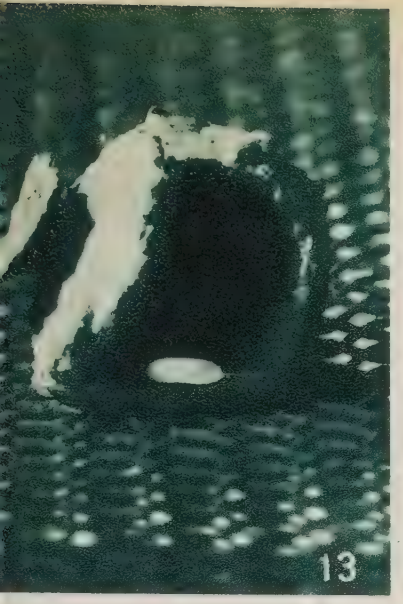
(4) Following the methods of many good home-builders, the little wasp first lays a rough floor. She finds it easier to use the clay-cement from the walls of a nearby abandoned jug than to dig up fresh clay. (5) Here the floor is finished and the side walls started, but there is not much left of the old jug-nest. (6) The jug-nest is built in the manner of a cistern, with thin, delicately modeled walls of cement that is a mixture of clay and saliva.



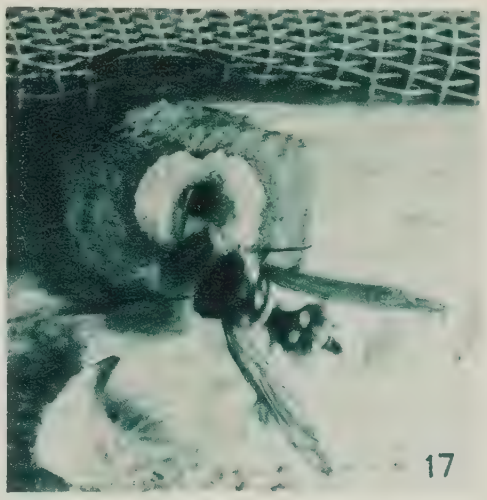
(7) The walls rise higher, the wasp carefully holding the soft clay in place as she adds to the height, usually modeling the clay-cement between her "forearms" and her "chin". (8) Now the wasp is beginning to "draw in" the walls to start the circular, arched roof. (9) The opening grows smaller as the dome approaches the "bottleneck". Apparently the male wasp is just a back-seat driver during most of the building operations, leaving the real work to the female.



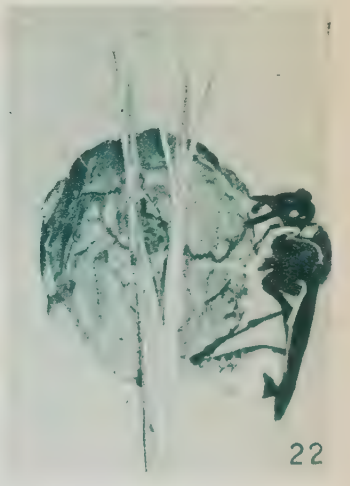
(10) Here the skillful little sculptress is modeling the bottleneck. But she is not through yet. (11) Not satisfied with simply leaving an opening, she finishes it off with a circular lip, or flange. Probably this flange is not merely ornamental, for it would certainly strengthen the delicate structure. (12) The female wasp is laying an egg. As she rests on the flange, her telescopic abdomen enables her to reach into the interior of the jug-nest.



(13) When we violate the privacy of the jug-nest we find a single egg, which is attached to the wall with a strong thread. (14) Within a few days the egg hatches, but, in the meantime, the mother wasp has been cramming the little brown jug with food for the offspring to be. (15) She catches small caterpillars and paralyzes them with her sting. But the poison does not kill the caterpillar. It is a cold-storage method that preserves the meat so that it does not spoil in the nest.



(16) Now the caterpillar is limp and helpless, and the wasp is getting ready to poke it through the opening in the jug. (She does this so swiftly that it was never possible to photograph her in the act.) (17) Here she is testing the interior of the jug with her antenna to make sure it is well filled with baby food. Then the wasp will cork the jug with another gob of clay-cement. (18) Several weeks pass. The food supply is running low, but the larva is about ready to pupate.



(19) First, however, there is another period of inner development and the final molt. It would seem that the wasp-to-be has been sitting on the end of its spine so long that it will never be able to straighten its back. (20) At last the pupa has turned into a wasp, although still a rather topsy-turvy one. (21) It is ready to kick a hole in the thin, fragile wall and back out. (22) A few hours of drying off in the sunshine, and the new wasp, now a strict vegetarian, is ready to take off in search of some nectar-laden flower, and, perhaps, to built some little brown jugs of her own.

Horacio and a spiny swift. This species of lizard is among the handsomest of North American reptiles, although its rough scales give it a rather prehistoric appearance. The firm grip of Horacio is because the lizard sometimes bites.

Carolyn and a rhinoceros beetle. Until it was proved that the dangerous-looking pincers would not pinch, the children gave the beetle a wide berth. A large specimen, its black "horns" and mottled, gray-green wing-cases make it a striking inmate.

Paco and a bull snake, the zoo's first inmate. It created a panic, at first, but when the children were assured that it is among the gentlest of all non-poisonous snakes, Paco asked to pose with it around his neck, although still with some distrust.

Mexican School Zoo

By GEORGE McCLELLAN BRADT

George McClellan Bradt, naturalist and photographer, has contributed several fine features to our pictorial pages. Now out of the Army, he has migrated with Mrs. Bradt to Mexico, where they collaborate in conducting a little school for a mining company. There is, as might be expected, considerable emphasis on Nature study. Here are some results.

La Profesora, better known as "Sis," and described by Mr. Bradt as a Nature-photographer's ideal wife. Here she holds the bull snake at its place of capture. The Mexican name for this reptile is "snake with fingernail," referring to the horny tip on its tail.

Lupe and a white-tail fawn. Found in the hills by some hunters, this zoo inmate was only three or four months old. It was exceedingly tame and gentle, and was a favorite of all. Of course, the unanimous choice of a name for the fawn was "Bambi."

Alma Rosa and some black and red "worms." These caterpillars of a species of sphinx moth obligingly turned into pupae. They live on a common roadside bush called Chia, a member of the sage family. The leaves of the bush have a minty odor.

Marlese and a kangaroo rat. This beautiful little rodent delighted the school by having two tiny, pink, blind, naked babies the day after she became a zoo inmate. One died, the mother killed the other. "They probably hatched too soon," said Marlese.

ky and a silver-haired bat, which hangs ide down in its cage all day, and dashes und nightly on silent wings. He eats ham- ger, bit by bit, for an hour each night. bites when handled at feeding time, but be picked up when intent on his food.

Horacio and some pupae. Told to be very still as the photograph was being taken, Horacio is a picture of pained concentration, worrying because the pupae, warmed by his hand, persisted in squirming incessantly. Appearance as moths is awaited.

El Profesor and a king snake. Mr. Bradt found this striking black and gold snake under a roadside rock pile, and it joined the bull snake as the second snake in the zoo collection. It placed second to its reptilian rival in the children's popularity contest.

STOCKING and maintaining a school zoo can be an exciting project, especially in Mexico. In this fabulous land the commonest animals, even those closely resembling our own most familiar ones, seem to have acquired added size, stranger shapes, or richer colors. It is almost as if they had tried to keep up with the exaggerated Mexican landscape, climate and vegetation. Perhaps this is due to a sort of mental mirage induced by crystal-clear air and brilliant sunlight, but, whatever the reason, the exotic scale and furred and feathered creatures that make up the Mexican fauna are ideal subjects for a school zoo.

In the fields and rocky hillsides surrounding the Tecolotes lead and silver mine at Santa Barbara, in the southern part of the Mexican state of Chihuahua, live many interesting animals, a few of which now inhabit our school. Its roster for the first month of operation included: silver-haired bat, kangaroo rat, family of white-footed mice, spiny swift, centipede, two rhinoceros beetles, tarantula, two bull snakes, baby white-tailed deer, two king snakes, three praying mantids, ring-necked snake, turtle, and a dozen chrysalids and pupae.

When my wife and I first began bringing in one animal after another, much uncertainty and distrust was evinced by children and parents alike. But after we had held a gentle kangaroo rat in our bare hands, let a praying mantis run up our arms, and wound a four-foot bull snake around our necks, all former fear and antipathy was replaced by a sincere affection and sympathy for these creatures of northwestern Mexico.

So wholehearted was the interest, in fact, that all the children became avid collectors and willing volunteers when the various specimens had to be held for photographing. The accompanying series of pictures show some of the zoo's inmates and their keepers. In a poll to find out which animal was considered the most interesting they were judged in the following order of popularity: bull snake, king snake, spiny swift, ring-necked snake, fawn, kangaroo rat, bat, tarantula, rhinoceros beetle, mantis and chrysalids.

As we get new or bigger specimens week by week, or as the older ones become difficult to feed, or lose some of their pristine interest, we either free them or preserve them in alcohol. But, whether we keep the specimens or not, in their photographs, and in the children's and our own memories, these fascinating creatures will be with us forever.

The snake's dark, forked tongue was of great interest, and Carolyn holds the bull snake while sister Sandra mimics the reptile's incessant flicking of the tongue. Below, Janet inspects a glass of pickled centipede in the zoo's museum section. Here are mounted insects, preserved specimens and drawings by the children of the animals.

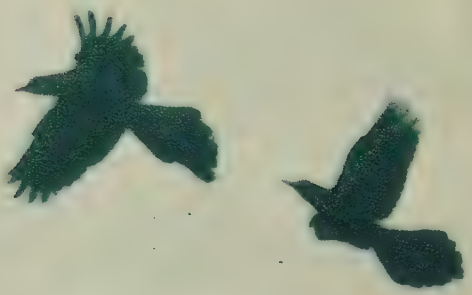
Florida Birds Awing

Flight Studies by Hugo H. Schroder

Sooty terns on the wing over Bush Key in the Dry Tortugas

A limpkin takes flight from its nest near Lake Okeechobee, Florid

Audubon's caracara takes flight from its nest tree, wing tips and tail spread, feet down. The American egret at the right in rising flight. One white ibis, lower right, is taking off, the other landing. Below is a roseate spoonbill in flight over a refuge, and, at the bottom of the page, a glossy ibis dropping to its nest.



A turkey vulture glides along on widespread wings. The two boat-tailed grackles at the right are a graphic demonstration of the reason for their popular name. A brown pelican drops to a landing in the nest tree, and, directly below, a ring-billed gull, wings and tail spread wide, makes a sharp turn.

Sentimentalism Again

NOW AND THEN we have devoted this editorial space to the words of others whose thoughts and sentiments we wholly or largely share. We are doing so this month, and, to preserve the traditional anonymity of the editorial page, our contributor suggests that we indicate that the editorial is written "by one who grows more weary yearly of the pretense that hunters are conservationists." In using the paragraphs that follow we do not subscribe to the implied conviction that *no* hunters are conservationists. We know many who are, but our acquaintance among the gunning fraternity happens to be mainly with those who recognize the necessity of maintaining a maximum number, consistent with available habitat and food supply, of those animals unfortunate enough to be classed as game. Sadly enough, such gunners are vastly in the minority among the larger body of those who go afield with the gun. Even some of this wiser group may not like some of the sentiments that our contributor expresses, but we feel that they are worth expressing in the interests of honesty and objectivity. So we lay our own pen aside and let our "weary" collaborator take over—

That the supposedly devastating epithet, "sentimentalist," has not recently been so often aimed by hunters at genuine conservationists may be due to proof submitted in these columns that sportsmen themselves are nauseatingly addicted to sentimentalism. However, additional evidence, gleaned from American writings old and new, may not be amiss in clinching the point.

In a long poem, "The Foresters," published in the early 1800's, Alexander Wilson, noted ornithologist, thus recorded the joy of his guides in slaughter:

"Down the smooth tide I view their floating lines;
With sudden glance the smoky vengeance pour,
And death and ruin spread along the shore;
The dead and dying mingling, float around
And loud the shoutings of my guides resound."

Rejoicing at the death of other living things, just as full of the joy of life as himself, is a feeling no man would have except for indoctrination with the sentiment that he is superior to all other living things and has a right to do with them as he pleases. It is exactly like the doctrine of the Nazis in relation to other people, and no more worthy of admiration and adoption.

Some decades later, but still in the days of no limits on hunter take, a prominent gunner wrote: "At the end of the day the bags were spread on the floor—281 golden plover and Esquimaux curlew. It was a grand sight!"

Now the plover is dangerously reduced in numbers and the curlew is apparently extinct; for their welfare, there were too many such grand sights. Spanners of the western hemisphere, with powers of finding their way over land and sea, which no man has or can even understand, they were ruthlessly slaughtered, essentially because of a perverted idea of pleasure—a sentiment, if you please, unmerciful and indefensible. "It was great sport."

It is sentimentalism again that ignores the danger of further exterminations, and promotes the hunting with great joy of remnant populations of game birds. As to the ruffed grouse, a recent writer emotes: "The air is crisp and you feel fit. Birds are wise and when you roll one . . . you glow all over." And another says of woodcock shooting: "Here was sport *par excellence*, clean, undefiled, lawful: something to make a man forget the iniquities."

On what explanation but that of sheer maudlin sentimentalism can such outbursts be understood? Glowing with pleasure at killing a beautiful, a wonderful bird just as much entitled to "life, liberty, and the pursuit of happiness" as any man, is the last thing a really humane individual would do. And to "forget the iniquities," while committing the great one of contributing to the extirpation of a bird now rare in most parts of its original range, is a contradiction of thought possible only to the thoroughly misled. Such sentimentalism is possible only to those trying to escape into a world of unreality.

For a crowning specimen, consider the following excerpt from "Ducks at Dawn":

"Onward they come; they're overhead;
we fire—again—again!
Forms hurtle down—distractedly,
the flock beats on amain!
In reed-beds are soft rustlings—
life stirs in marsh and wood;
The sun lifts over distant hills—
Ah God!—to live is good!"

One taking life and in the same breath thanking his God for the gift of life. Was sentimentalism ever carried to a mere disgusting extreme? This poet (save the mark) was correct in saying, "to live is good," but he forgot that it is just as good for ducks and all wild things as for men. When that truth finally sinks in, if it ever does, we shall have less of the sportsman's brand of sentimentalism and more real conservation.

Harvesters of the Plains

By DAVID F. COSTELLO

The mounds and the cleared circles of the harvester ants are conspicuous features of the plains. Each colony has a territory of 1000 to 5000 square feet around their home where the ants do most of their foraging. The author is photographing a small but well-constructed mound.

One recent summer day, under the brassy sun of the Colorado Plains, I straightened up in the hole I was digging to rest my weary back. Off in the distance the Chalk Bluffs near the Wyoming border shimmered in the heat of early afternoon. Far to the south a low line of fleecy thunderheads hung motionless on the horizon. In the west, sixty miles away, the snow caps of Long's Peak and the Mummy Range recalled days spent on their cool and inviting slopes.

Nearby, the strident rasp of grasshoppers in their short flights, the pungent aromatic scent of fringed sagebrush that had been crushed under foot, and the low call of a mourning dove impinged lightly on my consciousness. In the hole where I stood, myriad ants crawled about my shoes, or dropped out of the chambers of their exposed nest to pick up their eggs and larvae frantically and carry them back into the hidden recesses of what remained of their mound. They were big ants—harvester ants—nearly half an inch long. Just then I was not consciously thinking of the ants, or particularly observing them. I was thinking back over the past several years, and of the circumstances that had made me dig this particular hole.

My mind went back to my boyhood when I used to peer at the dooryard ants and their tiny crater-like mounds, or lie on the cool banks of a shady stream in the middle West and watch the wood ants foraging in their miniature jungle of weeds and grass. I often imagined what fun it would be to make myself small enough to associate on equal terms with the ants, to enter their houses and see for myself how they lived. This boyhood curiosity for Nature could not be satisfied then because I had neither the books nor the training to satisfy it.

The satisfaction came years later, as a side issue to studying cows and grass. I became a range researcher; and range researchers have to consider and study anything and everything that affects the grass that

Kangaroo rats have opened this mound in order to steal the seeds the ants have collected. The nests may also harbor many kinds of insects, which may be there as guests, marauders or commensals. It is certain that some of these, invited or otherwise, partake of the ant stores.

The rooms in the mound are circular with dome-shaped ceilings. They are numerous near the surface but rapidly diminish in numbers and size with increase in depth. Note the pebbles below the surface, indicating that the mound has been growing for a period of years.

cows eat. Thus ants once more were gradually forced on my attention as I became more and more familiar with the problems of the short-grass range of the Great Plains. And what better ants could one choose for study and observation than the harvester ants with their conspicuous mounds.

Standing there in the hole I had been digging, it suddenly occurred to me that these ants had made themselves large to compensate for my inability to make myself small; that I had realized a boyhood dream to enter their houses and see for myself how they lived.

A tourist asked me one day, "What kind of ants make the big mounds, and are they the same as the ones I saw in Kansas and in Utah?"

"Yes," I answered, "they live in Kansas, Nebraska, Colorado, Montana and a lot of other states. And they have been here a long time."

The tourist was intrigued by their harvesting habits when we were able to uncover some of the seeds stored in their granaries at the edges of the mounds. I mentioned that Solomon had hinted at the harvesting habits of ants, and that the writers of antiquity knew they collected and stored seeds. But the idea that harvesting ants really existed fell into disrepute, and was not revived until a study of their habits was published in Texas in 1880.

We fell to talking about travelers of the past who had seen the harvester ants. The harvesters were present in the far-flung expanse of prairie, plain, and desert that Coronado saw when he led the Conquistadores up from Mexico. They were present along the route of the undaunted Lewis and Clark on the way to the mouth of the Columbia. Colonel Dodge saw them in 1835 as he and his party traced the Platte River to the Front Range of the Rockies, and returned eastward by way of the Arkansas across the Great Plains. The tourist still sees them as he retraces the adventurous footsteps of the "Forty-niners."

Here is an ant that the traveler could well pause to contemplate; an insect with the attributes of a builder, a sun worshiper, and a philosopher. Whatever materials are present may be used in construction of its home. The door or opening of the hill is

In summer most of the life of the colony is lived in the chambers and galleries just beneath the thin crust that forms the roof of the mound. Seeds are stored in the chambers immediately below the ground surface at the edge of the hill where the cleared circle begins.

generally oriented to the sun for greatest warmth in spring. And the siesta is an established practice in well-ordered colonies.

The mound of the harvester ant is Gargantuan in comparison with the Lilliputian hills of our dooryard ants. It is a round-topped cone of earth, thatched with pebbles, sticks, or sand, occasionally reaching a height of thirty inches or more, and a diameter at the base of three to five feet. The mound is generally located at the center of a cleared circle, which varies in diameter from a few feet to nearly ten yards. These clearings, which are denuded of plants by the ants, are kept free of living vegetation and are enlarged year after year.

Each month during our summer grazing studies on the Plains, we drive the cattle in from the experimental pastures to the corrals for weighing. It really amounts to quite a job of scientific cow-punching since all the animals are numbered individually in each of twenty-six pastures and we do not like to get them mixed. The ants add to the fun and the work. They usually choose the August weighing time for their mating season. Hardly anything more pestiferous can be imagined than these countless thousands of flying creatures that cling to sweaty hands and faces on a hot sticky day in midsummer. They get into your eyes and hair, and invariably succeed in crawling inside your clothing. I have seen them make an embryonic cowboy in our scientific crew dismount in ignominy more than once, madly to tear his shirt off to rid himself of his tormenters. There is never any doubt as to the time of the ant mating season.

After the nuptial flight of the queens and males, the lives of these insects, and the early development of their colonies, become as inconspicuous as the winged flight was spectacular. When the female has mated she sheds her wings and searches among the grass blades where the soil is easily excavated. She digs a hole a few inches deep and connects it with a number of small, dome-shaped chambers branching from the main gallery. Here the first eggs are laid and from these the initial workers, not more than a few dozen, are developed. The queen mates only once, and, when the colony is finally established, she spends the rest of her life in the labyrinthian tunnels and chambers of the mound, and in the earth below.

The mound develops slowly. At the origin of the formicary it is only a tiny crescentic pile arranged by the queen. The hole from which this material comes is plugged in autumn. The following year the excavated material becomes a crater, like those of our dooryard ants. The third year it becomes the dome-shaped mass of earth and pebbles that denotes the fully established colony. When the colony prospers, the mound and the cleared circle may grow for twenty years or more.

The clearing around a healthy active colony is entirely devoid of vegetation. The ants literally chew each plant down. As the cut vegetation dries it is blown away by the wind, or is carried by the ants to the edge of the clearing. In fact, the clearing is kept scrupulously clean.

I recently observed a struggling, tumbling mass of harvester ants working frantically over the carcass of a large ground beetle in the tangled debris at the edge of their cleared circle. Being in a helpful mood, I lifted the beetle, ants and all, placed it near the door of the mound, and then squatted down to see what they would do with so large an object. More and more ants rushed from the hill to aid in the struggle. In less than half a minute the beetle had been carried to the edge of the circle, a distance of nearly three feet. The ants repeated this maneuver for me three times in succession, and were at it the fourth time when I grew tired of watching. They left little doubt about the cleanliness of their housekeeping.

People who are occasionally addicted to a little teleological reasoning have decided that the ants denude their yard in order to establish a fire line in their prairie home. However the practice of denudation may have started, it not only protects the mound from the heat of prairie fires but it also prevents the entrance of rain water into the nest along the channels that would be left by dead and decaying roots. In fact, the very bareness of the circle around the mound promotes the accumulation of heat in the soil and the quick drying of the surface after rainstorms.

The mound itself is covered by pebbles; or, if pebbles are absent, the covering consists of whatever material the country affords. Up in the lava country of Idaho I have seen my old friends, the harvesters, using cinders for their rooms. But most frequently they use pebbles. Some of the pebbles are excavated by the workers and brought to the surface from the tunnels below. The majority, however, are collected among the grasses and weeds. On most any summer day, one may observe, on a hand-and-knee expedition, many ants laboriously moving "boulders" many times

Ant Hill

By HERBERT MERRILL

I stumbled headlong yesterday and found
Myself sprawled out upon the summer ground,
And peering down an ant hill, like a god
That tripped upon a world and found a clod.
My blue eye swam above them like a cloud,
My breath was wrapped about them like a shroud,
I spoke into their crater like the thunder,
And panic flowered, red as fire under
Tinder of the earth. Out tumbled hordes
Of warriors, erect and waving swords
Above their helmets, blades as sharp as glass.
Battalions searched the jungles of the grass,
And I got up and laughed and wandered on,
And left the world that I had lain upon.

their size and weight across the cleared area and up the steep inclines of their miniature mountain. Foolishly, it seem, they frequently carry their boulders completely over the mountain and deposit them on the downhill side.

If a person kicks a mound, as nearly everyone does, or if it is partially destroyed by animals, wind, or other means, it will be rebuilt. The ants will carry all their boulders back again, even those that have been scattered in the grass and weeds beyond their bare dooryard. The time required is a matter of days or weeks, depending on the strength of the colony. Frequently the new structure is of greater dimensions than the old.

A little digging into the mound will soon demonstrate that it has a rind or covering consisting of earth and rocky particles cemented together by the ant workers. It is resistant to the weight of small animals and is more or less impervious to moisture. Entrance to the interior is gained by an opening, with east or southeast exposure, about two-thirds of the distance below the top of the cone. A few inquiring scientists have found, with the aid of thermometers, that this location is related to the incidence of the sun's rays, and is the warmest spot on the hill in early spring.

The ants are not early risers. They usually are not active before nine in the morning. During the heat of mid-day the doorway is frequently closed and activity outside the mound comes to a standstill. In the afternoon the small pieces of gravel, which have been used to barricade the opening to the nest, are removed. Activity of the colony is at its height until late afternoon. At sundown the doorway usually is again barricaded, not to be opened until morning.

Some more digging into the mound will soon show that the interior is a labyrinth of dome-shaped chambers and connecting galleries. The chambers are circular, with level floors and low arched ceilings. Often the larger rooms are three inches in diameter and nearly an inch from floor to ceiling. The hallways or galleries, which are somewhat less than half an inch in diameter, form passageways between the circular chambers and connect one story of rooms with another. In fact, the nest extends many stories underground, down to the catacombs some nine to twelve feet below the surface. There some of the seeds are stored, and there the colony hibernates in winter.

The life of the colony is carried on largely in the upper chambers and galleries, which are warmed by the summer sun. The social organization consists of queens, or fertile females, males, and workers, which are sterile females. During the breeding season all stages of ants may be found: eggs, small larvae, pupae, immature workers, and adult insects.

At harvest time certain of the chambers are used as granaries. These cells are usually located just below the ground surface at the periphery of the nest. Here the garnered seeds are stored.

Harvest time is a time of threshing as well as garnering. The hulls and chaff are torn off by the ants and deposited outside in the dooryard, while the plump ripe seeds are placed in the storerooms. In late autumn the lowest storerooms are packed with more seeds than those near the surface. This is a wise precaution because kangaroo rats and mice are fond of digging into the upper chambers and stealing the hoarded treasure. And when winter comes, seeds that are stored beneath the frost line are available to the ants and are protected from deterioration.

Long rainy spells in late summer sometimes moisten the stored seeds, or they become wet if the mound is broken and rain is allowed to enter. The resourceful ants then may carry their seed supply to the surface to dry in the sun. Otherwise the seeds germinate and grow, or mold and disintegrate. This is a trying time. The wind may blow away or rain may destroy the winter food supply while it is exposed on the surface of the mound. If this happens, the colony perishes from starvation.

The harvester ant is no epicure. A cosmopolitan appetite for seeds allows a choice of almost anything within the vicinity of the nest. The seeds of pigweeds and lambsquarters are as acceptable as are those of knotgrass or prairie sunflower. In cultivated fields the ants will not eschew the seeds of millet, or any other agricultural produce they can store. On country roads they may be seen collecting the wheat seeds that have fallen from passing trucks and wagons. In their native home on the plains and prairies they fill their granaries with seeds of an endless variety: brome grass, squirrel tail, witch grass, porcupine grass, dropseed, prickle poppy, bee plant, saltbush, and scarlet globemallow. Even the seeds of the lowly dandelion are welcome provender. Like good farmers, they keep the different kinds of seeds in different bins.

The harvester ants are of good disposition in relation to their fellow creatures. The tiny mounds and crescent-shaped hills of other ant species are allowed to remain in their bare circular dooryards. Even their nest is not sacrosanct. It harbors many kinds of insects; whether guests, marauders, or commensals, it is difficult to say. But there are present, ground beetles, lesser ants, termites, and others numbering into the hundreds. It is certain that at least a few of these uninvited guests partake of the harvested stores of their hosts.

In defense of their home when larger animals are involved, the harvesters are more aggressive. Defense takes precedence over all other activities. One has only to pat gently on the mound with hand or stick and countless ants appear as if by magic. None but the staunchest intruder will care to remain. The defenders can both bite and sting. The unwary person who disturbs the mound, and then unwittingly allows the ants to crawl upon his person, can expect the observation to end only in precipitant flight.

I had the temerity and scientific curiosity one day to watch the stinging proc- (Continued on page 164)

Chrysanthemums donated by Mrs. Albert D. Lasker make a rich carpet in the mall at Central Park, New York City. On the opposite page, Mrs. Lasker, crusader for beauty through the distribution of millions of chrysanthemum seeds, and one of the plantings of 'mums dedicated to the donor's mother, Mrs. Sara Woodard. These are planted in Bryant Park, back of the New York Public Library.

Memorial Gardens and Highways

By ANDREW S. WING

CIVIL WAR monuments were homely and quaint, usually lacking in artistry. After World War I huge and ugly crops of tanks, field cannon, machine guns and other dragon's teeth sprang up in public squares from Newport to San Diego. Perhaps it was the impact on the public mind of these latter atrocities that helped to bring about the present trend towards memorial reform. Or, perhaps, as a nation we are beginning to grow up. Sculpture we appreciate, I am sure, as much as before, perhaps even more. But it is no longer considered necessary that every memorial to a war hero, a distinguished citizen, or a late departed be of granite or marble. On the contrary, it is now generally considered a mark of good taste to create something that it *not* ostentatious, and which, at the same time, is of some use, or at least gives pleasure to the passerby.

So the implements of war and battle scenes are to be forgotten as memorials, we trust, and in their place will grow green lawns, trees, shrubs and flowers. If a modest statue or two, or a stone bench, are set in appropriate surroundings as part of a living war memorial, there is no objection, but they should not stand out like a sore thumb as the main feature of the memorial.

What are war memorials for? They can be ostentatious symbols of naval or military victories, about which who cares over-much? Or they can be sincere tributes to the men who brought about these victories. But it seems to make more sense to memorialize these events with something that the average man can appreciate and enjoy. In these days when good news is none too common, we can do well to focus our attention on the finer things, the beautiful and restful creations of man and Nature. And of all artistic forms Nature's are the easiest and the pleasantest with which to live.

Visitors to New York City in the late fall have been impressed with the mass plantings of hardy chrysanthemums that add color to the somber, citified plantings in such places as Central Park, the Plaza, Bryant Park, and in Riverside Park. Probably many native New Yorkers are aware that these lovely flowers—of all shades and colors except blue—are the gift of a generous lady, Mrs. Albert D. Lasker, who has thus memorialized her mother, Sara Woodard. Together with her sister, Mrs. Alice Fordyce, Mrs. Lasker conceived the idea of adding some fall color to the public places in Manhattan and its environs. Park Commissioner Robert Moses agreed, and accepted a bag of seeds of a hardy strain developed by Dr. E. J. Kraus of the University of Chicago on the Lasker estate. The result is several acres of 'mums that bloom into late November, brightening bleak spots where nothing ever bloomed that late, and prolonging summer well into autumn.

As Mrs. Fordyce told me, "All we did was crusade. . . . Crusading can get your nerves jangled and your feelings hurt. But it's fun! Especially if you get results. And we did, with the help of wise public officials and a few thousand other people who feel as we do, we now have hardy chrysanthemums blooming from coast to coast."

The idea started in 1940. The Kraus strain of 'mums was so hardy, and so generally satisfactory when grown from seed, that it seemed a shame not to have them more widely grown. They do not all come perfect from seed; some are prettier than others, and winter hardiness varies. Nor are they show flowers, but the choice selections, when seen in mass, are really gorgeous, and they are little trouble to grow. Weed out the poorer ones, and propagate the best selections from divisions or cuttings, and you soon have a border full. As a result of the crusade started and persistently carried on by the two sisters, nearly a million and a half chrysanthemum seeds were distributed free in 1946. If only half of the plants survive, there will be a lot of flowers next year.

Many of the seeds went by request to veterans' hospitals, colleges, schools, parks and other institutions. Especially good reports, and pictures, have been received from such places as Brigham Young University in Utah, Butler University in Indianapolis, Illinois Institute of Technology in Chicago, Smith College Botanic Garden, Wilberforce College in Ohio, and the Veterans Administration at Coatesville, Pennsylvania, to name only a few. Garden clubs, school grounds, cemeteries, and numerous war memorial committees have also received generous supplies of seeds. In all, 3000 requests were received in 1946, many of them as the result of a cover picture and an article that appeared in a November, 1946, issue of *This Week Magazine*. Mrs. Lasker and her sister are especially interested in institutional plantings and war memorials, but all requests have been filled as long as the seeds lasted. A sheet of directions accompanies each packet of seeds.

While no one else has attempted a nationwide beautification program on this large a scale, the Blue Star Highway of the National Council of State Garden Club Federations promises, when completed, to be as stunning a war memorial as has yet been conceived. Started in New Jersey by the Garden Club Federation, the first stretch of highway to be completed is planted with dogwoods. The idea, as I understand it, is to have at least one main highway crossing each state, this to be planted with the official tree, or at least one that does well in the locality. Eventually, no doubt, there will be a through transcontinental highway, as well as other local memorial roads, that have been beautified with suitable plantings. Progress on this plan is being made, but must inevitably be slow on such an ambitious project.

Those who have had the pleasure of riding on such beautifully planted highways as the Hutchinson River in Westchester County, New York, and its continuation, the Merritt Parkway in southern Connecticut, will appreciate any attempt to preserve and restore our natural scenic beauty, which in too many cases has been swept away by ruthless road builders and

greedy commercial interests. Even the short bits of highway that have been planted in such spots as Lancaster, Pennsylvania, with its roses; the Eastern Shore of Virginia, with its roadside plantings of crepe myrtle; Winsted, Connecticut, with its mountain laurel, are not only beautiful in themselves but an inspiration to other communities to do likewise.

As to landscaped war memorials, many communities have made a start, but there is still much that might be done. Local garden clubs, service clubs, and various civic clubs can be helpful in such projects. It takes not only promotional push but follow-through to get these efforts accomplished. Money must be spent to do this work and to keep up the plantings after they have been made. This may be either taxpayers' money or funds made available through generous gifts or public collections. On large-scale projects tax money will usually be necessary, and this necessitates educating the public to the desirability of the work to be done. Often it is possible to point out that owners of real estate will, in the long run, benefit through an increase in property values.

Proper zoning, and the protection of highways from the intrusion of unsightly billboards, ugly refreshment stands, slummy dance halls, taverns and stores, will tend to build up suburban and rural communities that otherwise might go to seed. There is need for this protective zoning in every community and county in the land when adequate zoning laws do not now exist. At present there are only twenty-two states that have enabling acts making county zoning possible, a truly shocking reflection on the indifference of what we like to regard as the world's leading nation.

Within the next decade there will, no doubt, be thousands of new super-highways stretching across the land, many of them through virgin country that is yet unspoiled and often rich in landscape beauty. To protect and enhance this natural beauty is the duty of our public officers and lawmakers. But will they do their duty without being urged? I hope so, but results do not usually come that way.

The individual citizen, you and I, can do much in our own little spheres by seeing that our own yards and roadsides are kept neat, clean and beautiful. We can join with our neighbors and fellow townsmen to push and encourage this good work. We need more crusaders like Mrs. Lasker and Mrs. Fordyce.

Not long ago an International Peace Garden Association was formed in Canada, one of the founders being Mr. Henry J. Moore of Ontaria, who writes: "As a result of the establishment of the International Peace Garden on the Canadian-U.S.A. boundary, other gardens are projected for international frontiers and for boundaries of provinces and states. These are likely to be memorials to world peace, and to be known as Peace or Goodwill Gardens. We have started a movement to organize a World Federation of Horticulture with a view to promoting better relationships between the people of all nations, and in some way help to bring about peace and goodwill on earth.

"We now have an International Peace Garden Association and are prepared to work with any organization interested in the same ideals. . . . We would like to have New Zealand join up with us in some way, also South Africa, Australia, and other parts of the British Commonwealth. The United States is already with us and all other countries will be contacted in time; that is, when the world has regained its equilibrium."

The first International Peace Garden between Canada and the United States comprises 2200 acres in the Turtle Mountains, of which 880 acres are in this country. Here are scenic lakes, hills, valleys, flowers, wild fruits, and trees, forming a natural beauty spot on the western prairies. It is proposed that five million dollars be appropriated for this project—one million for development and four millions to be set aside as an endowment to assure its maintenance.

The Civilian Conservation Corps was actively engaged in the development of the United States section, among the projects being a dam that created a large lake. Drives and roads, bridges, fences, overlook shelters, a lodge building, picnic areas, and tourist cabins were developed. On the boundary line of the two nations stands a cairn, built of native stones and bearing the pledge of peace sworn by the two nations: "To God in His Glory we two nations dedicate this Garden and pledge ourselves that as long as men shall live we shall not take up arms against one another."

The world needs more international peace gardens; we need more state and local parks and playgrounds where the beauties of Nature can be enjoyed; we need more and finer beautification projects close to home where we can see them every day. These are the important things that we should work and strive for in the years of opportunity that lie just ahead.

★

Preparation

By VEGA IHSEN

Caught at sunset, on the mead;
Glistening, criss-crossed in the light,
Spider webs from weed to weed
Are lashing down the world for night.

NEW YORK ZOOLOGICAL SOCIETY PHOTOGRAPH

European red deer in the Bronx Zoological Park in New York. These animals are placed in the same genus as our American elk, which they resemble in structure and habits.

Kentucky's Red Deer Problem

By CARLOS VINSON

INTRODUCTION and establishment of exotic species of wild birds and mammals has been going on for many years in the United States. However, the question still arises whether any of these experiments are successful and advisable from the standpoints of Nature and economy. I am afraid not. As a good example of what I mean, let us look at Kentucky's experiences with the European red deer.

Back in 1930, a well-to-do Kentuckian by the name of Isaac Bernheim, who owned a vast estate in Bullitt County, obtained fifteen European red deer from England, and released them on his estate. A botanical garden was also established, and many exotic kinds of plants and animals were kept there. Naturally, the red deer were kept in enclosures.

In 1934 an undetermined number of these deer were taken to a 300-acre fenced area near Dawson Springs, Kentucky, by the State Game Division. In four years the herd had increased to sixty-seven. Of these, six or eight animals were released between the Cumberland and Kentucky Rivers in the area that is now the Kentucky Woodlands National Wildlife Refuge. The rest were taken to Pike, Harlan, and Leslie Counties, a mountainous section, and were released in the forest areas. According to the Kentucky game authorities, those that exist today as wild stock in Bullitt, Hardin, northern Nelson, Spencer and Meade Counties are offspring of the original stock on the Bernheim estate, from which a number of animals escaped.

The European red deer is a native of Europe, and was introduced into England and Scotland many years ago. The height of the deer averages about four feet, and their weight ranges from 350 to 500 pounds. Their summer coloration is a reddish-brown, their winter coat a grayish-brown. They are named in natural history books *Cervus elaphus*, in the same genus as the American elk, and they closely resemble the American species in structure and habits. Their flesh is dark red and much like that of the white-tailed deer.

The red deer have not succeeded well in the eastern mountainous sections of Kentucky, and, of course, many have been killed by mountaineers. Only an occasional one is now reported in the counties where they were released. Since agricultural crops are

KENTUCKY GAME DIVISION PHOTOGRAPH

A small herd of European red deer take off across the fields on the dead run. They are wary and slip quietly from cover, which makes control no easy matter.

grown in the narrow valleys, and as these deer are largely grazing animals, they have been killed when they came down from the mountains to feed on the crops. There are still a few of them in the Kentucky Woodlands Area. It is estimated by Kentucky game officials that at present there are about 500 in the counties surrounding the Bernheim estate. In fact, they have increased to such an extent in this area that they have been playing the very devil with farmers' crops. It was for this reason, only a few years back, that the Bernheim estate authorities requested of the Kentucky Game Division that the herd be exterminated. This was the object of an open season in 1945. However, although 596 special licenses were sold, only twenty-nine red deer were killed during the entire season. The sportsmen who went after them learned that the animals were extremely wary, slipping from cover, rather than jumping from it, and thereby eluding the hunters. But the first big hunt for the deer scattered the heavy concentration about the Bernheim estate to the four winds, so it now remains to be seen if this will widen the domain of the European red deer in Kentucky. The authorities are hoping that it will not have this unfortunate result.

At the time the red deer were in the enclosure near Dawson Springs, several white-tailed deer were penned with them. The white-tails avoided their exotic relatives, keeping completely away from them. The red deer also browsed much higher than the white-tails, and did more damage to vegetation. There is thus every reason to believe that these aliens would supplant the native white-tailed deer in any habitat they took over.

In satisfactory habitat the red deer appear well able to take care of themselves, and, as is the case with most exotics, have few natural controls, tending to increase beyond natural limitations imposed on native species. Due to their tendency to graze, their heavy damage to agricultural crops, and their apparent competition with native deer in the mountain browse areas for food, Kentucky officials have found it undesirable to introduce the red deer in other areas of the state. In fact, as the matter now stands, they would like very much to get rid of the animals that they have.

But this is not likely to be easy. Now that the heaviest concentration of them has been scattered over a much wider area, Kentucky officials are wondering just what effect this will have. Time will tell, but what is going to happen during that time? Will Kentucky's red deer herd now increase to where more drastic control methods than hunting will have to be employed, or will future investigations by game technicians prove that these exotic deer can be tolerated in limited numbers? So far, all evidence points toward the fact that these Europeans are an undesirable addition to Kentucky's wildlife supply.

★

To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then, below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

The Heavens from Earth's Poles

By ISABEL M. LEWIS

THE NORTH and south poles of the earth are the world's worst places for observing the heavenly bodies. For more than six months the sun never sets and the stars are invisible. There are, however, times when Venus can be seen even in daylight, and the moon also can be seen by day. Aviators depend on these three bodies for a "fix" of position when flying over the polar regions in daylight.

The period of daylight actually exceeds six months by about three days at the poles. The celestial pole lies, of course, directly above the earth's pole in the zenith and the equator coincides with the horizon. The stars that are above the horizon never set but circle around the pole in diurnal circles parallel to the equator, completing a revolution around the pole once every twenty-four hours. As a result of refraction, however, there is a narrow strip of the heavens, less than a degree in width, directly below the equator in the opposite hemisphere, within which an object appears to be above the horizon although actually below it. So it is that the sun becomes visible in the spring before it crosses the equator by as much as 36 hours, and for an equal interval of time after it has crossed the equator at the beginning of fall.

As soon as the sun appears on the horizon in the spring it makes a complete circuit of the heavens in this plane, and, gradually, on succesive days spirals upward until at the summer solstice it is at its highest elevation of about 23½ degrees above the horizon. Keeping this altitude practically unchanged for a few days, the sun then starts on its downward spiral toward the horizon, which it reaches at the beginning of fall, to disappear 36 hours later until its re-

turn in the following spring. The seasons are, of course, reversed at the opposite pole, and the period of darkness at the south pole occurs at the time of daylight at the north pole, except for that period of a few brief hours in spring and fall when the sun is visible at both poles, due to the effect of refraction.

Twilight at the poles lasts longer, continuously, than anywhere else on the earth. It occurs only twice during the year—in the spring before the sun appears on the horizon, and in the fall after the sun has passed below the horizon. Civil twilight, as it is called, lasts during the interval that the sun's angular distance below the horizon does not exceed six degrees; nautical twilight during the interval that it does not exceed twelve degrees; astronomical twilight during the interval that it does not exceed eighteen degrees. The last named lasts from complete darkness to full daylight, if it precedes sunrise, or from full daylight to complete darkness, if it follows sunset. The two others, nautical and civil, end, or begin, with a greater degree of illumination.

During the interval of civil twilight, which at the poles lasts for about a week, it is possible usually to carry on ordinary outdoor pursuits as readily as in daylight. Only the brightest of the stars would be seen during the period of civil twilight.

Nautical twilight usually gives sufficient illumination to read a sextant or other nautical instruments, and at the poles it lasts for nearly two weeks. A month during which there remains considerable illumination at the pole may be added, then, to the six-months-and-three-days period of bright sunlight. This will leave a five-month period of darkness, or what one might expect to be darkness, at each pole in season. The long night at the pole is often far from dark, for there are the brilliant auroral displays, so commonly seen in the polar regions, with their magnificent curtains, streamers, and other varied forms of illumination. The hours of continuous light from the moon in its full and gibbous phases are also greatest in number at the poles. Since the full moon is always opposite to the sun in the heavens, its path during the winter months is the same as that of the sun six months earlier, or later. The full—and nearly full—moon never passes below the horizon in the long polar night. That is, the moon is above the horizon in winter *at the time when it gives the most illumination.* The crescent moon is never seen in mid-winter skies at the poles, or the full moon is never seen in summer skies.

In the comparatively few periods during the long polar night when the moon is absent and there are also no auroral displays, one might see, if at the north pole, Polaris nearly in the zenith, and all the familiar constellations of the northern heavens circling around the pole; slowly near the pole, far more rapidly near the horizon. Many of the familiar constellations that appear in the mid-latitudes are missing, among them Canis Major, with Sirius, brightest of all the stars; Scorpio, with Antares and its many other bright stars; Rigel, in Orion, which rises only halfway above the horizon; Fomalhaut, in the constellation of the Southern Fish, and Spica in Virgo, another constellation lying half above, half below the horizon at the north pole.

At the south pole, in the corresponding winter season, occurring in our summer months, one sees no bright star overhead to mark the position of the pole, and, in fact, no bright stars at all within twenty degrees of the pole. Nearer the horizon, however, appear, in addition to the Southern Cross and other constellations of the southern hemisphere, the beautiful constellation of Scorpio, and all the other groups missing at the north pole. These include some of the most brilliant stars in the heavens. At the south pole one fails to see among the constellations that revolve around the pole continuously, and never set, our familiar Big Dipper and Cassiopeia; Gemini, Taurus, and Leo; Auriga, Bootes, and Cygnus, which contain such well-known stars as Vega, Capella; Arcturus, Aldebaran, Castor and Pollux, and Regulus.

In the winter months at the south pole one finds that the same difficulties arise in viewing the stars as at the north pole—long hours of brilliant moonlight and frequent and intense auroral displays. One should add, possibly, to the handicaps that would attend observations at the poles the nights when clouds or raging blizzards obscure the heavens, although these may be no more prevalent at the poles than elsewhere in the polar regions.

The poles of the earth are also the world's worst places for observing the planets. Whenever a planet is on the opposite side of the celestial equator from the pole, except within that narrow zone just below the equator affected by refraction, it will be invisible. Mercury, which is the closest to the sun of all the planets, will be below the horizon with the sun for months at a time. There will also be equally long periods when, with (Continued on page 164)

Spring Clouds

By FLORENCE ALBERTA WALES

Tonight white sheep stretch out across
The pastures of the sky,
As if while nibbling blue-green slopes
They might have strayed too high;

For in the sign of Aries, flocks
May wander where they will
And on the meadows of the night
Lie resting soft and still,

Warmed by the daisy stars that dot
The skyey hills with fire,
While in the west the Ram stands guard,
Their own celestial sire.

The School Page

Edited by E. LAURENCE PALMER

Professor of Rural Education, Cornell University, and Director of Nature Education, The American Nature Association

THE CIRCUS PARADE

An able science teacher recently decided to take his first-grade daughter out to look at the moon and stars. No doubt he had some slight desire to improve his standing with his first-born by showing her that he knew a thing or two about astronomy. If this did constitute any considerable proportion of his purpose, he was completely routed by what happened.

Once the couple were in the open, where Nature in the raw could be seen by anyone, the youngster started in to tell her Dad what was what. He learned that the stars were candles that the fairies carried about. This whimsical explanation of an interesting phenomenon did not disturb him. Then he learned that the moon was twice the size of the earth, that it turned around once every day so that you could see all sides of it, and that it was "Oh, ten hundred miles away." This was too much. Papa opened up a few of his big guns and tried futilely to correct what his child had been taught by one of the poorest students he himself had ever had. But what the youngster had learned in school was to his child the last word. Dad knew nothing.

The father asked the youngster if she would believe him if he told her that the rain came from the ceiling. She said that she would not because she could see that it did not. He then asked her if she believed the stories about the moon turning and being "ten hundred miles" away and being twice as big as the earth, or, as she added, "as big as two houses," because she had seen houses. She admitted that she based her beliefs on what her first-grade teacher had told her was so, and that what the teacher said was authority, so far as she was concerned.

Now let us examine this experience to see how all this happened. How did a first-grade teacher, who obviously knew next to nothing about the moon, find herself teaching a youngster about it? Well, in the first place, it was in the "state outline" that she must teach about the moon. Besides, it was in the elementary science textbook that one should teach about the conditions on the moon to first-grade youngsters. Also, the teacher did not know what else to teach during the science period, and so away she got on the magic carpet of her imagination, supported by a few distorted facts, and there you are. She "had a way" with little children, and so she became an elementary teacher, with the aforementioned results.

Of course the explanation has roots deeper than those illustrated by the incident just cited. Even the fairies' candles got in the picture somehow. Let us see if we can understand it a little better.

Back about 1749 Benjamin Franklin presented a nature-science philosophy when he wrote: "Much of it falls within the capacity of Persons, even of Children. It consists in attending the objects with which Nature presents us, in considering them with Care, and admiring their different Beauties, I say that even Children are capable of Studying Nature, for they have Eyes, and don't want curiosity; they ask Questions, and love to be informed; and here we need only awaken and keep up in them the Desire for Learning and Knowing, which is natural to all Mankind. Besides this Study, if it is to be called a Study, instead of being painful and tedious is pleasant and agreeable. . . ." We have gone a long way from that sound philosophy in the last two hundred years. Possibly this has been because there have been so many "band-wagons" going by to distract us.

In 1859, Edward A. Sheldon went from Oswego to Toronto and became exposed to the Pestalozzi system. He came back and gave us the "object method of teaching." For some time this band-wagon stole the show. Sensory experience with any object was the basis of learning, we were told. Not long after, H. H. Straight, who joined Sheldon's staff and who had worked with Agassiz at Penikese, suggested that it would be better if we studied the object in its natural setting, and away we went on that tangent, which, incidentally, marked a most phenomenal period of development in this field of nature and science education.

Jackman of Pittsburgh, and later of Chicago, modified Harris' academic science developed in St. Louis, and added it to the work of Straight and Sheldon. He gave us an early and sound yearbook of the National Society for the Study of Education, and suggested year round studies that put seed dissemination, and spring flowers and bird migration, into the training experience of most teachers of the elementary schools. He added "time" to Straight's "place" philosophy. Then a depression came along, and agriculture was in a bad way. Mrs. Comstock and L. H. Bailey brought the better parts of Jackman, Harris, Sheldon and Straight down to earth, and gave the experiences an agricultural setting. The cities wanted some of this, and so there joined the parade the school garden band-wagon, on which the late VanEvrie Kilpatrick eventually tooted a most persistent horn. About this time Bigelow of Columbia thought he detected some real music in the whole effort. So he, with Mrs. Comstock, C. M. Weed and others (possibly Hodge), tried to develop a plan that would harmonize all these divergent interests. To bring this about he organized The American Nature Study Society, and started publishing *The Nature Study Review* some forty years ago. In spite of growing pains caused by poorly prepared teachers trying to do what they did not know how to do, the fundamentals of the sound philosophy developed by this group have persisted. Possibly some will say that the school garden bandwagon went off in one direction, and eventually became represented by the National Council on Elementary Science, after it had split off a school garden association or two. Maybe it did, but, about the time in the twenties when Bigelow and Caldwell at Columbia began to surrender their responsibilities to others, along came the elementary science bandwagon that was going to save the world for science.

This elementary science bandwagon, which set out to show the world how much its drivers knew, eventually reached a point where it showed how much they did not know. It sprouted elementary science texts that glittered with so many misstatements of fact that, to some of us, these began to characterize the movement, as distinguished from the philosophy that had been enunciated by Franklin and developed by Sheldon, Harris, Jackman, Comstock and Bigelow. The child who would not believe that the rain came out of the ceiling because she could see that it did not, was using the Jackman, Comstock, Bigelow philosophy. When she told her Dad that the moon was very far away, (Continued on page 162)

Camera Trails

By EDNA and BILL EVANS

NATURE photographers like to get out of doors every month in the year but, sometimes, when March is showing its lion-like aspects, the most ardent Nature photographer finds it more comfortable to stay indoors and toast his shins by the fire. After all, a fellow doesn't have to go outdoors every day. Why not wait until one of those March lamb days comes along?

If there be a "Camera Trails" reader who has never succumbed to the above weakness, we will be happy to send him a cast-iron certificate, decorated with stainless steel edges, for supreme ruggedness.

For those readers who, like ourselves, have spinelessly stayed indoors while the March lion roars, we have another suggestion. We have had a lot of fun with the idea, ourselves, and we think others can, too. Possibly they have already done so.

Our March indoor camera pastime is what is known as "tabletop photography." Actually, it does not have to be done on a table—and it can be done out of doors, if the light and other conditions are right.

Tabletop photography, in brief, consists of setting up a miniature scene—using whatever "props" are appealing or available, and then taking a picture of the said scene. The field is almost limitless—bounded only by the cameraman's imagination and the materials he finds at hand.

Nature photographers will find in tabletop photography the opportunity to take pictures of scenes they cannot otherwise obtain—without the expenditure of considerable money and effort, plus whatever time is necessary to get to the actual scene and home again. Sometimes the scene is absolutely unavailable, mainly because the photographer happens to live a million years or so too late.

Take, for example, the dinosaur picture that is one of the illustrations for this section. We couldn't find a real, live model, no matter how hard we tried. But we have always been fascinated by stories of these great extinct reptiles. We have always thought what wonderful models they would make.

We did not have a "time machine," and we did not know where to buy a ticket to 1,000,000 B. C. But we did have a small china dinosaur—a brontosaurus—and there were plenty of props. So, on a damp, chilly March day, we decided to go for a dinosaur shoot.

This dinosaur picture was taken indoors, using two photoflood lamps. A couple of puffs of pipe smoke provided the hazy atmosphere.

This "Lone Giraffe" shot was on an outdoor tabletop, using only natural light.

We set up our prehistoric scene on a card table. We made a cliff with a couple of books and then used a heavy bath towel for the ground covering. A couple of water-worn coral rocks were introduced as scenery, plus a few small, leafy twigs. Some bare, angular stems broke up the foreground.

In order to cut the reflection of our floodlights from the dinosaur's glazed surface, we coated the beast with cold cream and then dabbed him lightly with talcum powder. For lighting, we used two photoflood lamps—one set low at the left and the other high on the right.

Since we were focusing sharply on the animal's head, the background did not matter so much. Actually, the background was white cheesecloth—but it was so much out of focus that it did not show at all. Then, to give our scene the proper atmosphere of eerie haze, we blew a couple of puffs of pipe smoke into the setting—and shot the picture.

Maybe a real live brontosaurus would not look like that—and maybe he wouldn't be caught in such surroundings. But we like the result and we think it was worth the trouble we took to get it.

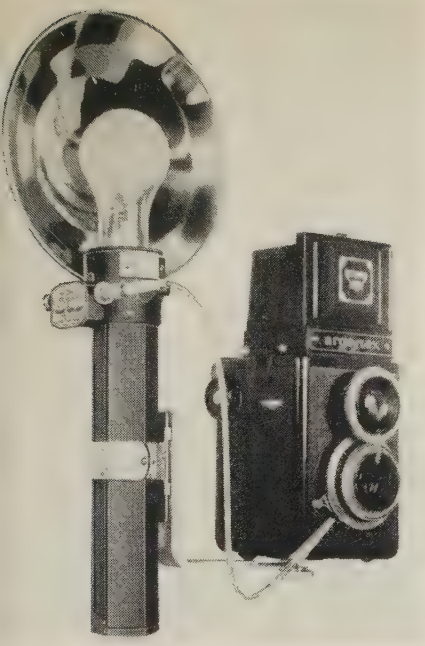
And, to show another variation that can be obtained by tabletop photography, we respectfully submit our "Lone Giraffe" picture. This was an outdoor shot, set up in the back yard and taken without recourse to artificial lighting. Before building the scene, we studied giraffe pictures in books on African exploration. We did not try to duplicate any particular scene—we were only trying for a reasonably accurate "atmosphere."

For the ground in this picture we used builder's sand dumped, a handful at a time, on the tabletop and allowed to lie as it fell. The background is a sheet of brown cardboard, and the "trees" are feathery branches from a handy shrub. The "rocks" are Brazil nuts (we have no pebbles in Florida) and the grass actually is grass pulled up from the lawn.

The giraffe is a china ornament measuring eight and a half inches from hoof to horn-tip. Highlights on the giraffe's glazed surface were cut by cold cream and talcum, just as in the case of the dinosaur. The exposure meter told us what lens opening and speed to use (we could shoot slow because there was no danger of our subject galloping away), and, while the result may not be the real African McCoy, it is probably as close as we will get for some time to come.

These are only two examples of an almost limitless range of subjects for tabletop photography. It is a field open to both amateurs and professionals. Indeed, there are professional photographers who make a regular business of tabletops for magazine illustrations.

One professional tabletop cameraman manufactures many of his subjects from vegetables. Others model or carve their



An Argoflex camera with the special model of the Kalart Master Automatic Speed Flash synchronizer. These small twin-lens cameras continue to be popular, while the flash gun gives them increased versatility.

subjects from wood, soap, clay, wax, metal or wire. Actually, "a rag and a bone and a hank of hair" can apply to tabletop characters as well as to Kipling's "woman who did not care." Artistically inclined photographers paint elaborate backgrounds for their tabletops. Some results are so natural that they almost seem to outnature Nature.

The Nature photographer who prefers to do his shooting outdoors, and who wishes to follow the tabletop procedure, can train himself to watch for artistic miniature settings. The rock garden may become a jagged mountain cliff. Ordinary grass, taken from the proper angle, can be transformed into more than man-sized Indian elephant grass. Twigs, gnarled bits of wood and pebbles can become effective props, or even the main centers of interest in a tabletop picture.

We have seen some attractive Christmas cards made from tabletop settings. Christmas is months away, but good ideas can always be filed for future reference.

The possibilities are legion—travel, exploration, history, fantasy—everything from Mother Goose characters to cave men. We feel that the more versatile the Nature photographer is, the more fun he will get from his hobby. The worst chore is not in building the scenes, but in putting things away again after the shooting is over.

Camera Chatter

And now for other subjects of photographic interest. Almost everybody likes to pore over catalogs, no matter whether he is a rural resident miles from the nearest store, or a city dweller with all kinds of merchandise just around the corner.

We recently received a camera supply catalog—a "wish book" that will make any shutter fan's mouth water and his fingers itch for a pen and an order blank. This is the new mail order catalog issued by the Penn Camera Exchange, Inc., 126 West 32nd Street, New York 1, N. Y. It is a 72-page publication listing up-to-date photographic equipment and accessories, together with full illustrations, descriptions and prices. It is set up in loose-leaf style so more pages can be added as new equipment becomes available. Free copies can be obtained by writing to the Penn Camera Exchange at the above address. Mention "Camera Trails" when you write for your copy.

Judging from the demand reported by camera supply shops in our vicinity, small, twin-lens cameras are becoming increasingly popular. By using them, people can see what they take when they take it, and still have a camera small enough to carry around with comfort.

To augment the services of cameras of this type, the Kalart Company recently announced a special model of the Master Automatic Speed Flash for the Argoflex camera. Flash guns can do wonders to help Nature photographers shoot pictures under poor light conditions. We hope the shortage of flash bulbs will be a thing of the past by the time this section gets into print.

As a sign the war is definitely over, genuine German-made Leica cameras are again being imported and are being distributed through E. Leitz, Inc., of New York. These cameras, long considered "tops" in the miniature field, are being brought into the United States by arrangement with the Office of Military Government, U. S. E. Leitz, Inc., reports that money derived from importation of Leica cameras will be used to defray part of the cost of the occupation of Germany.

From Eastman Kodak Company come reports of several new types of equipment. To meet the needs of amateur movie makers who frequently have to do repair jobs on their films, the company has begun the distribution of a Cine-Kodak master editing outfit for 16mm movies. The outfit includes rewind, splicing and viewing features.

Eastman also reports that Kodak's line of Ektar f/6.3 lenses, intended for general purpose commercial and industrial photography, is once again available. . . . So is the Kodak tabletop tripod, elevation eight inches, after a war-long absence. . . . While the new model of the Kodak all-metal printer is coming back with extra features designed to better its pre-war good performance.

Trial offer to PHOTOGRAPHERS

Special!—4 monthly issues of The Camera, 35¢, bookcase size magazine, for $1.00. In each issue: a complete Camerette (how-to-do-it booklet on popular subject); more than 100 illustrations; feature articles by famous photographers; latest color information; cash prize monthly print contest. New readers only. Offer expires Aug. 1. Send $1.00 today to

The Camera, 519-3 Morris Building, Baltimore 1, Md.

NATURE LOVERS' LIBRARY

Six Giant volumes, 8½ x 11⅛, 2,000 pages, weight 23 pounds. Lives and habits of 3,000 species of birds, mammals, reptiles and fishes described by world famous Naturalists; 1,000 species illustrated, 300 in natural colors; published at $29.50.

The Literary Mart, 8 East 33rd Street, New York, offers this set to readers for $24.50, returnable for full refund after 5 days' examination.

FEET HURT?

TRY DR. BARRON'S NEW FOOT CUSHION

Do you suffer from metatarsal callouses, corns, weak arch foot pains? Try Dr. Barron's New Foot Cushions. LIKE WALKING ON A PILLOW! Soft, Spongy, Air-ventilated. Fits all shoes. Cushions your arches and feet from heel to toes. Dr. Barron says: "Wonderful for tired, aching feet!" Send only $1.98 for A PAIR, or C.O.D. plus postage. State shoe size and if man or woman. 30-DAY TRIAL GUARANTEE. Money back if no blessed relief. ORTHO CO., 111 W. 83 ST. Dept. 97C, N.Y.C.24

RHEUMATISM

ARTHRITIS-NEURITIS-SCIATICA

If you suffer the agonizing pains of these diseases when the usual remedies have failed, learn about a new trustworthy, modern, non-surgical treatment method. This marvelous treatment is completely explained in the Ball Clinic's FREE Book. Write today. No obligation. BALL CLINIC Dept. 543 Excelsior Springs, Mo.

DREER'S 1947 GARDEN BOOK *free*

Write today for your free copy of this well-illustrated 100-page book full of valuable planting information. A guide to successful gardening, offering Dreer's Quality Seeds, Bulbs, and Garden Supplies.

HENRY A. DREER, Inc.
163 Dreer Bldg., Phila. 23, Pa.

WILD FLOWER SLIDE FILMS
OF THE NORTHEASTERN STATES
(Uncolored)

Early Spring Flowers; Late Spring Flowers; Summer Flowers. 26 single frames to each film with manual. $2.00 per film. Other areas in preparation.

WILD FLOWER PRESERVATION SOCIETY
3740 Oliver St., N.W., Washington 15, D. C.

Nature Study Society Meets

High praise for the workshop method of resource-use or conservation education was voiced by educators and scientists at the 35th Annual Meeting of The American Nature Study Society, in Boston, December 27 and 28, 1946.

"The Workshop Method," explained Roberts Mann, Superintendent of Conservation of Cook County's 37,000-acre Forest Preserve District in and around Chicago, "is the medium by which we bring teachers and leaders in direct contact with the land, with its flora and fauna, with the problems created by the people's use or misuse of the land, and with the problems in teaching wise use of the land."

Reports on workshops in Virginia, Pennsylvania, Indiana, Rhode Island, and at the Audubon Nature Center in Connecticut were followed by a very comprehensive analysis of the Resource-Use conferences now being conducted on a wide scale in fourteen southern states. This highly coordinated regional movement is under the direction of John Ivey, Jr., of the University of North Carolina.

Edwin Way Teale, well-known Nature writer, was elected president of the Society, succeeding Charles E. Mohr, of the Academy of Natural Sciences of Philadelphia. Mr. Teale gave an illustrated lecture on "Walden" at the annual dinner, at the Hotel Bradford. Richard W. Westwood, president of the American Nature Association and editor of Nature Magazine, was elected vice-president, and Richard L. Weaver was re-elected secretary-treasurer. E. Laurence Palmer was chosen AAAS representative.

Workshops have distinct advantages over other outdoor teacher-training methods, reported Gilbert W. Mouser, of Cornell University. He based this conclusion on visits to 150 camps and training centers. Mr. Mouser found that workshops excel (1) in giving abundant, first-hand experience with natural resources, (2) in being under the direction of both science specialists and experienced classroom teachers, and (3) resulting in the preparation of teaching units that many teachers are using enthusiastically and effectively.

Cap'n Bill Vinal, Massachusetts State College, presided at a panel discussion on "Improving Camping Education through Greater Use of Natural Resources." Taking part in the program were Ellsworth Jaeger of the Buffalo Museum of Science, Benton Cummings of Amherst, Massachusetts, Wes Klusman, director of camping, Boy Scouts of America, Cass Miles, New York State Department of Education, and Dorothy Miller, Iowa State Teachers College, Cedar Falls.

One of the major "bottlenecks" cited by the camping leaders was the lack of "competent naturalists with specific training in the psychology and techniques of conducting field trips." The scarcity of teachers with similar training was deplored by school executives.

A third session was devoted to reports by state directors of conservation work in New England on their present programs and their plans for the future. Part of this program was broadcast over station WBZ.

Conservation should not be presented as a separate subject in the elementary or secondary schools, educators at the opening session agreed. Speaking for the various subject matter fields—the biological and physical sciences, social sciences, health education, and geography—they explained how to increase natural resource planning and conservation in our school programs through present subject matter areas.

This page will be used henceforth, jointly or alternately, for news notes of the American Nature Study Society and the National Association of Biology Teachers. Charles E. Mohr, Director of Education for the Academy of Natural Sciences of Philadelphia, 19th and the Parkway, Philadelphia 3, Pa., will be editor for the American Nature Study Society; Dr. E. Laurence Palmer, Department of Rural Education, Cornell University, Ithaca, New York, for the National Association of Biology Teachers.

The National Association of Biology Teachers

The National Association of Biology Teachers welcomes the opportunity of cooperating with the American Nature Study Society in the preparation of a page dealing with matters of professional interest. Most important, recently, has been the meeting held in Boston in connection with the annual meeting of the American Association for the Advancement of Science.

This year the Biology Teachers session continued the precedent established last year of building its program around some one important factor in the teaching of biology. Last year conservation was emphasized. This year the program was built around ecology.

A general symposium on ecology, and the teaching of ecology, brought forth important viewpoints from recognized leaders in the major fields of science normally considered as making up the science of ecology. General ecology, botany, malacology, zoology and paleontology were represented, either by the presidents of groups in these fields or by a selected speaker. There was marked unanimity of opinion as to the importance of field work, and emphasis was placed by the speakers on the importance of activities dealing with reality. This viewpoint was not shared by all who participated in the subsequent discussion.

With the possible exception of Dr. Hervey Shimer, who presented the ecological aspects of paleontology, the speakers showed some tendency to limit their illustrative material to their chosen field. This was to be expected, just as it was natural that paleontology should look to the whole field of biology, as well as to the fields of meteorology and geology, physics and chemistry. Without specific planning in advance to that end, the speakers showed a nice distribution as to the importance of considering ecology as a servant to a happy economy, a stimulating scholarship and a satisfying recreation. Dr. VanderShalie, representing the malacologists, pointed to the implications in health education, and in general marine biology, that should arise from a study of the mollusks.

The afternoon program was devoted to the aspects of teaching the philosophy that was developed by the speakers in the morning. Dr. Richard Weaver presented the Nature study viewpoint; Dr. Charlotte Grant the high school science teachers' viewpoint; Howard Michaud the story from the viewpoint of the biology teacher. In this part of the program there was less agreement than seemed to be evident in the morning's discussion. Dr. Grant suggested initial procedures calling for understandings of conditions in remote parts of the world, and for the study of maps made by others in preference to the making of maps by the students. In short, she defended the deductive procedure as contrasted with the inductive technique as a teaching plan. In the following discussion she found both support and opposition, which is as it should be in any symposium of this sort.

The theme initiated in the discussion for the day was nicely rounded out by a paper by Dr. Paul Sears given at the annual banquet, which was attended by representatives of the American Nature Study Society, the National Science Teachers Association and the National Association for Research in Science Teaching. At this meeting, the retiring president of the N.A.B.T., Prevo Whitaker, introduced the incoming president, E. Laurence Palmer, and the president-elect, Howard Michaud.

The papers presented, or summaries of them, will appear in *The Biology Teacher*, the official organ of the National Association of Biology Teachers. General information regarding the organization may be had from the secretary-treasurer, Mr. M. A. Russell of 403 California Ave., Royal Oak, Mich.

A Zoologist Recalls

The World Expands. By George Howard Parker. Cambridge, Massachusetts, 1946. The Harvard University Press. 252 pages. $4.00.

Many and distinguished have been the contributions to science of George Howard Parker, Professor of Zoology, Emeritus, at Harvard University. A bulky volume could be written setting forth these achievements, but that is not the purpose of this book. Instead it is a delightfully written, witty and entertaining autobiography of a zoologist and naturalist. In a lifetime in which he was associated with many whose names are immortal in the field of natural science, Dr. Parker had rich experience. His travels and explorations brought him in contact with many other individuals quite outside his chosen field. Of both scientist and just ordinary human being he writes with equal charm, and one and all will find these recollections happy reading. R.W.W.

The Coyote

Coyotes. By Wilfrid S. Bronson. New York. 1946. Harcourt, Brace and Company. Illustrated by the author.

This little book for the younger reader is the second in Mr. Bronson's natural science picture book series, profusely, accurately and entertainingly illustrated by the author. Mr. Bronson's treatment of the coyote is a friendly and much-needed approach when so many hands are raised against this wild cousin of the dog. In other hands this book could have been a lurid and prejudiced attack upon the coyote; instead it is a worthwhile book that we hope will be read by many youngsters.

Conservation Contest

A variety of awards for essays, posters, plays and projects by school pupils in the 7th and 8th districts of New York State are announced by the Conservation Forum of Buffalo and Western New York. Students in those districts may obtain further information from Secretary, Conservation Forum, Holland, New York. An exhibit will present the winning entries at the Buffalo Museum of Science May 10.

Nature Salon

From May 20 through June 16, *Hobbies*, the magazine of the Buffalo Museum of Science, will hang its Ninth International Salon of Nature Photography in the Central Hall of the Buffalo Museum of Science. There will be two sections—monochrome and color, and entries may be made in five different classes. Complete conditions and an entry form may be obtained from the magazine at the Museum. The last day for receiving entries is May 18.

Think of it! This amazing low price brings you 100 blooming size gladiola bulbs—8 glorious rainbow mix colors in these 2-year-old, high-price varieties: Picardy, Dr. Bennet, Shirley Temple, Peggy Lou, Maid of Orleans. We will replace any bulb which does not **FLOWER 5 YEARS.** Order now while they last! Sent in plenty of time for spring planting. Money back guarantee.

EXTRA-Prompt orders receive 3 TUBEROSES without additional cost. Bloom first year into waxy white, fragrant flowers, 2 to 3 ft. tall, can be grown in pots, too.

SEND NO MONEY — RUSH ORDER

Cash orders sent prepaid—else pay $1.94 plus postage on arrival. Send order, name and address to

MICHIGAN BULB CO.
Dept. GE-1814 • Grand Rapids 2, Michigan

EARLY SPRING FLOWERS

All hardy—for Rock Gardens, Borders, Bedding & Shady locations. Good mature plants—Immediate bloom.

Spring Flowering—Height 6 to 10 inches

Asarum Canadensis—(Wild Ginger)
Dicentra Cucullaria—(Dutchman's Breeches)
Hepatica Triloba—(Liverwort)
Phlox Bifida—(Cleft Phlox)
Sanguinaria Canadensis—(Bloodroot)
Viola Blanda—(Sweet White Violet)
Viola Pubescens—(Downy Yellow Violet)
Viola Pedata—(Bird's-foot-Violet)

Spring Flowering—Height 16 to 30 inches

Aquilegia Canadensis—(Wild Columbine)
Arisaema Triphyllum—(Jack-in-Pulpit)
Dodecatheon Meadia—(Shooting Stars)
Mertensia Virginica—(Blue-bells)
Geranium Maculatum—(Cranesbill)
Phlox Divaricata—(Sweet William)
Polyginatum Biflorum—(Solomon's Seal)
Uvularia Grandiflora—(Bellwort)

1 each or 8 plants for $1.00
5 each or 40 plants for $4.50
10 each or 80 plants for $8.00

WE PAY THE POSTAGE. *Order early!*

All orders promptly acknowledged

FREE CATALOG:
Hardy Wildflowers & Ferns, Hardy Perennials

LOUNSBERRY GARDENS
OAKFORD, ILLINOIS

SPECIAL OFFER

Colorado Blue Spruce. 4 yr. transplanted 3 to 6 in. tall — only $1 postpaid. 22 only $2 postpaid! Another Bargain: 40 Evergreens, $3 postpaid; all transplanted, 3" to 10" tall. Ten each Scotch Pine, Black Hill Spruce, Red Spruce, White Spruce, all 40 for $3. (West of Mississippi River add 25c.) Free illustrated price list of small evergreen trees.

ALL TREES GUARANTEED TO LIVE
WESTERN MAINE FOREST NURSERY CO.
Dept. NM-37 Fryeburg, Maine

DELPHINIUMS

One year field-grown plants—Sure to bloom.

IMPROVED BELLADONA — Glistening, light sky-blue. IMPROVED BELLAMOSUM —Velvety, rich dark-blue. Either of above: Thrive under wide range of climatic conditions. 10 for $1.00; 60 for $5.00; postpaid. GIANT PACIFIC HYBRIDS—Large flowered. Double and semi-double flowers, of the most beautiful color combinations, closely set on tall spikes. FOUR COLOR GROUPS: Dark Blue; Light Blue; Lavenders; Giant White. 6 for $1.00; 35 for $5.00. Catalog of Perennials and Rock Plants—free.

LOUNSBERRY GARDENS, OAKFORD, ILL.

ON DOUBLE DUTY

KILLING INSECT PESTS

Protects Flowers — Fruits — Vegetables

Black Leaf 40 kills aphids, leafhoppers, leaf miners, most thrips, young sucking bugs, mealy bugs, lace bugs and similar small insects which swarm by the millions and suck the life out of plants of all kinds.

KILLS BY CONTACT AND BY FUMES

— and "a little goes a long way"— one ounce makes six gallons of effective aphid-spray.

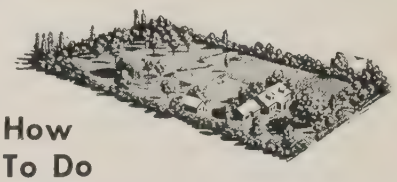
Insist on original factory-sealed packages for full strength.

LOOK FOR THE LEAF ON THE PACKAGE

TOBACCO BY-PRODUCTS & CHEMICAL CORP., Incorporated, Louisville 2, Ky.

THE TEN-YEAR INDEX
(Volumes One to Twenty)
makes Nature Magazine a textbook. Order yours now . . . 50c

"a little land— a lot of living!"



How To Do Wonders on an Acre!

Our FREE BOOKLET will tell you all about our "HAVE-MORE" PLAN for "a little land -a lot of living" . . . how to do wonders with an acre or so of land . . . wonders with a garden, fruits, berries, poultry, livestock, etc. . . . . all on a small scale . . . in your spare time!

How, thanks to the NEW Science of Miniature Farming, thanks to the quick freezer and many other new inventions, you can actually raise most of your family's food in a few hours of spare time a week and **enjoy** doing it. . . . How to add a "Harvest Kitchen" to make your house a more pleasant and productive home (your wife will love it) . . . how this new way to live on an acre or so of land can mean better health, more happiness, more security and independence for you and your family.

FREE BOOKLET

We Robinsons know because we've lived this way for years. Our "HAVE-MORE" PLAN gives you the benefit of all our experience working out the small-scale, scientific, wonder-working methods we tell you about. (Perhaps you've seen the stories about our 2-acre miniature farm in **Reader's Digest, Better Homes and Gardens, etc.**)

If you'd like to do WONDERS with an ACRE . . . if you'd like to make the very most of the garden, farm or country home you now have or hope to have some day—please write to me now for our FREE BOOKLET about our "HAVE-MORE" PLAN. I guarantee it will open your eyes to some mighty good new ideas and to a far more satisfying way to live in these United States! Send now to:

Ed Robinson, Box 3603, Noroton, Conn.

THE SCHOOL PAGE

(Continued from page 157)

distant, maybe "ten hundred miles," and very large, "as big as two houses," and "twice the size of the earth," she was giving us some of the harvest of the elementary science attempt to be erudite. The "fairies' candles" represented, of course, one of the absurd offshoots of the old Nature study that never received any considerable support from those we have mentioned as leaders, and certainly none from Franklin, Sheldon, Straight, Jackman, Harris or Bigelow.

We lately had a "Thirty-first Yearbook" of the National Society for the Study of Education that gave us some hint of what the elementary science bandwagon was trying to advocate. We understand that a new yearbook in this field is to appear in March. We are hopeful that it will represent a return, to some extent at least, to the philosophy of Jackman presented in the "Third Yearbook" of that Society. If it does not, we will expect to hear that kindergartners will come home and discuss uranium deposits, nuclear physics, and the effect of atomic bombs on genes.

Of course there are always those who come to see the parade after most of it has passed by. One commentator at the Boston meetings said that he understood that Nature study had become interested in ecology only in the last "three or four years." He could not have read the whole of Ben Franklin's statement of two hundred years ago. He could not have followed Straight's dictum evolved from Agassiz's philosophy; he could not have known that in 1900, when Cornell had a big summer school class in Nature study, that George F. Atkinson offered a course entitled "Ecology or Nature Study in Its Broadest Aspects." In fact, it seems to me that he must have just about missed the whole show.

In kindness to most critics of the Nature-study idea, I think that it can honestly be said that most of them are critical because they have not taken the time to see what the fundamental philosophy has been, or have been too interested in making a new bandwagon on which they can have a seat and toot a big horn, and maybe collect a few royalties at the gates. I will not say it is wholly a racket from this bandwagon. We have had this sort of thing in education in general when we had projects, and activities, and progressive education, and so on. These parades of bandwagons are all right, but please try to stand back once in a while and get some of the music of the whole performance.

Maine Conifers

Through a handy little twenty-page bulletin entitled "The Conifers of Maine" the College of Agriculture, University of Maine, Orono, Maine, presents information on these native softwoods. The bulletin is written by Fay Hyland and presents excellent identification drawings together with accompanying descriptive text.

Audubon Camp

Offering five two-week sessions for teachers, youth leaders, camp counsellors and other adults with a professional or hobby interest in Nature, the Audubon Nature Camp in the Todd Wildlife Sanctuary on an island in Muscongus Bay, Maine, opens its ninth season on June 13. The last of the five sessions will be from August 15 through August 28. The site of the camp offers a wide variety of land and water habitat, and the courses are conducted by a staff of experienced specialists. Full details about the camp and application blanks may be obtained from the National Audubon Society, 1000 Fifth Avenue, New York 28, New York.

A Bad Situation

Within the boundaries of our national parks and monuments there remain some 600,000 acres of non-Federal land over which the National Park Service has no control. This, says Newton B. Drury, Director of the Service, "is a constant threat to the integrity of these areas and a serious impediment, in many cases, to sound development and economical and effective administration." In his annual report Mr. Drury estimates that it would require $1,250,000 to $1,500,000 a year for twenty years to purchase these lands. Delay will mean increased costs, as well as continue to complicate park and monument direction. Western members of Congress, ignoring the wealth that these parks bring to their respective areas, have opposed these acquisitions on the ground that it would remove more land from the tax rolls. This is obviously a short-sighted attitude, and the Congress should establish and carry through this program.

Our Mysterious Cat

The Puma; Mysterious American Cat. By Stanley P. Young and Edward A. Goldman. Washington, D. C. 1946. The American Wildlife Institute. 358 pages. Illustrated. Frontispiece in color by Walter A. Weber. $4.00.

Here is the most nearly complete work on this great American cat, which originally was found from the Straits of Magellan northward over most of South America; throughout Central America; the United States from the Atlantic to the Pacific; extending in Canada only slightly in New Brunswick and along a narrow strip in Quebec, Ontario and southern Saskatchewan; along the Rocky Mountains northward nearly to 60 degrees N.; in British Columbia to about 53 degrees, and throughout Vancouver Island. It is noteworthy that this animal's entire range coincided almost exactly with those of some species of deer, on which the cat mainly subsisted. With the occupation of much of our country by man and his domestic animals, the cougar was necessarily reduced or exterminated. It is now probably extinct everywhere east of the Mississippi, and continues in greatly reduced numbers in most of the Rocky Mountain states.

The habits and other characteristics of the puma are treated in great detail, and constitute the most interesting part of the book. Mr. Young's long experience in control work has well fitted him to judge with care the value of the varied and voluminous oral and published reports of fancied and real attacks on man, and to eliminate from serious consideration many that still persist in the literature.

It is unfortunate that more people cannot learn of the rarity of really trustworthy accounts of actual attacks on man that have been recorded. It would seem that many persons like to think that we *must* have dangerous wild neighbors, and that, with the disappearance of the big cat, our lesser bobcats have inherited similar powers.

The technical history of the puma, by E. A. Goldman, describes the colors and, especially, the cranial characters and the measurements of the thirty forms as now recognized. The evolutionary relationship of our present-day pumas to such fossil species as have been detected is also discussed. A well-selected bibliographical list, arranged by the authors, and an index, close this comprehensive volume.

In view of the prominent part that has been taken by the Biological Survey (now the Fish and Wildlife Service) in the control of this interesting mammal, which—since the rising tide of settlement has reduced its normal food, and, at the same time, has introduced to its haunts a tempting variety of domestic animals—has become locally destructive, we are glad to note that the authors, in a brief foreword, close with this sentiment:

"It is hoped that this volume will afford a better understanding of a distinctly American species, which with its mysterious and inscrutable ways is of surpassing interest and under a suitable measure of control deserves a permanent place as a wilderness animal." Here and there through the text, similar pleas for its consideration may be found by the interested reader. We must record the opinion, however, that these well-meant pleas would have more force if the 27 pages on hunting and control—with numerous detailed illustrations—the substance of which is largely available in pamphlet form, had been briefed. E.A.P.

THE READER'S MARKET

A place where members of the American Nature Association and readers of Nature Magazine may find many interesting offerings, or may advertise themselves, at low cost, for things wanted; things they have for Sale, for Trade, for Sale or Trade. This is an excellent forum for acquiring or disposing of such items as binoculars, books, cameras and photographic equipment, magazines, sports and outdoor equipment, etc.

GENERAL REQUIREMENTS APPLICABLE TO CLASSIFIED ADVERTISING

1. *Transactions based on good faith:* Transactions are based on good faith and mutual satisfaction. Deliberate misrepresentation, disregard of usual business ethics or the attempt to circumvent these general requirements, when brought to our attention, will result in refusal of further advertising.

2. *All orders subject to these conditions:* We reserve the right to edit all copy to conform with our standards and to reject or discontinue any advertisement which we consider undesirable.

3. *Who may advertise:* This department is an open market trading post. Any individual or firm whose advertisement and methods of doing business meet our requirements may advertise their goods or services.

4. *Rates:* All classified advertisements must be accompanied by remittance. The rate is 15c per word including name and address—minimum charge $2.00. Cash with order.

5. *How to count numerals, etc.:* Groups of figures are counted as one word. Abbreviations consisting of initials or single characters likewise are counted as one word. Hyphenated words are counted as two words.

6. *"For Sale" ads must state prices:* A specific price must be stated on all FOR SALE ads —except that the phrase "write for catalog" may be used when listing real estate or merchandise in quantities.

7. *Conditions of trade or sale:* The condition of binoculars, cameras, instruments, other equipment useful to outdoor lovers, home-owners, etc., advertised for sale or trade must be specified as follows: PERFECT—meaning factory condition; EXCELLENT—meaning new condition, implying negligible amount of use; VERY GOOD—meaning practically new condition, implying little use, with no appreciable wear and only minor surface scratches or wear; GOOD—meaning moderate condition and with only moderate wear; FAIR—meaning no parts missing necessary to use, reasonable wear inside and out; POOR—meaning marred appearance or badly worn.

8. *Non-specific phrases barred:* Phrases such as "highest" or "top prices paid", as well as any other so-called "auction-type" phrases are not acceptable. The terms "fair price paid" or "state price wanted" may be used.

9. *Blind ads not acceptable:* Box number or blind ads will not be accepted. Give your complete name and address to insure prompt delivery of all mail or telegraph replies.

10. *Requesting privilege of examination:* Purchasers desirous of examining merchandise before acceptance should request shipment by express C. O. D. with examination privilege. This procedure permits the purchaser to inspect the merchandise in local express office and authorizes the express company to return unsatisfactory merchandise at shipper's expense.

11. The association will not accept for publication in NATURE MAGAZINE, advertisements of firearms, ammunition, or patent medicines.

12. *Responsibility for illegible copy:* Type or print advertisement plainly as we cannot be responsible for errors due to illegible writing.

13. *Closing date:* The closing date of all advertisements is the 20th of the second month preceding month of issue.

ANTIQUE GLASS FOR SALE

MOON AND STAR: List for stamp. Forrest Sowers; Doylestown, Penna.

ATHLETIC GOODS

BAR-BELLS, DUMB-BELLS. Exercise equipment, courses. Free catalogues. Good Barbell Co., Dept. N, Reading, Penna.

BOOKS

TWO ILLUSTRATED, 48-page booklets. 75c each postpaid. LONGS PEAK. Its story and a guide for climbing it. NEZ-BITS. A variety of campfire features for mountain entertainment. Paul Nesbit, Estes Park, Colo.

BECOME FINANCIALLY INDEPENDENT! The rules of acquiring wealth are explained fully in the book "Seven Cures for Lean Purse." Send $1.00 for postpaid copy. Satisfaction guaranteed, Bedard Publications, P. O. Box 637, Detroit 31, Mich.

ANALYZE handwriting for fun, knowledge, and profits! 10 complete lessons, and FREE analysis of your writing, $1.98. Details free. Satisfaction guaranteed. N. W. Oliver, Box FC, Mansfield, Tenn.

TREES BY ROGERS, 291 pages, 226 species $2.50
Garden Flowers, McCurdy, 111 pp., 400 kinds $2.00
Wild Flowers, Blanchan, 270 pp., 170 kinds $1.50
Butterflies by Weed, 286 pages, 109 species $1.50
Books are 8¼ x 5½ inches, 48 color plates each. American Book Dealers Guild, 8 East 33rd St., New York City, N. Y.

BOOKS—SAVE MONEY, Free Prizes. You select your prize or cash. Best Sellers, details for stamp. Prices slightly above WHOLESALE. Thomas J. Schmitt, Box 3253, Terminal Annex, Los Angeles 54, California.

NATIONAL GEOGRAPHIC MAGAZINES 1888—1947, any issue. Free literature. Periodical Service, Box 327-N, Swarthmore, Pennsylvania.

SECURE your out of print and second hand books from The Audubon Book Service, 415 Lincoln Ave., Brooklyn 8, N. Y.

BOOKFINDERS! (scarce, out-of-print, unusual books) Quickly supplied. Send wants. Clifton, Box 1377nm, Beverly Hills, Calif.

WANTED, First issued volume "Nature on Parade," Fair price anticipated. Richard L. Schwartz, 3809 Main St., Houston 4, Texas.

BULBS

BULBS FROM HOLLAND. Catalog describing hundreds of varieties of Tulips and Daffodils free for the asking. J. Heemsherk, c/o P. van Deursen, SASSENHEIM—HOLLAND.

BUTTERFLIES

GIANT living Silk Moth Cocoons: 15 mixed for $1.00. Living Praying Mantis Egg Masses for biological control of insects; 12 for $1.00. Postage Extra. National Nature Supply Laboratories, P. O. Box 47, Station "E", Brooklyn 7, New York.

BUTTERFLIES: 20 names from U. S. including parnassius, $2; 20 world tropicals including gorgeous urania, $2; 10 from Mexico, $1; living cocoons. M. Spellman, 2781 Grand Concourse, New York 58, N. Y.

CAMERAS

CAMERAS—FILMS—HOME MOVIES. Photo supplies. Free catalog. Dayton Film, Inc., 2227 Hepburn, Dayton 5, Ohio.

DOGS

BLACK LABRADOR, and Irish Setter pups. Registered and guaranteed. Earl Bond, Albert Lea, Minnesota.

FARMS

NEAR ATLANTIC CITY, N. J. $100.00 for cleared level farms and tree land, 80 ft. x 300 ft., stone surfaced county roads; deer, quail and other game. Beautiful homesites fifty feet above sea level—$5 monthly. Fred Delker, owner, 2219 W. Venango, Philadelphia 40, Pa.

FIELD GLASSES

SKYSCOPE, the new 3½" reflector. Precision ¼ wave aluminized mirror. Sixty power Ramsden type eyepiece. Equatorially mounted on sturdy metal legs. Used by schools, universities. Price complete $19.75. Write for descriptive literature. The Skyscope Company, Inc., 475 Fifth Ave., New York 17, N. Y.

60 POWER TELESCOPE, $2.95. 250 power microscope, $2.45. Send for free catalog of Telescopes, Binoculars and Microscopes. Brownscope Company, 24 West 45th St., New York.

GAMES

RACE HORSE CRIBBAGE, fascinating game, colored design, 12x12 inches 25¢. McGonigle, Box 163, Point Richmond, Cal.

GENEALOGY

TRACE Your Family History with "Guidex" Genealogical Research Guide—$2.00. Lists 1000 Sources, Indexes, and hints. Family Guidex, P. O. Box 829-N, Annapolis, Maryland.

HOBBIES

EARTHWORM CULTURE. A fascinating hobby; profitable home industry. Write for valuable free bulletin-review on "Earthworms: Their Intensive Propagation and Use."—Thomas J. Barrett, Earthmaster Farms, Box D-488, Roscoe, California.

LEATHERCRAFTERS! Send for catalog listing leathers, kits, supplies. Kit Kraft, Dept. A, 1607 South Western Ave., Los Angeles 6, Calif.

$10,000,000 FREE—ANNUALLY—prize contests. You can win fortune. Expert help. Free nationally advertised gifts to patrons. Bulletin free. Cash Register-X, 210 Fifth Avenue, New York 10, N. Y.

EARN MONEY AT HOME—Assemble colorful handmade jewelry! Free details. Beginner's outfit, $1.00 (refundable). Plastic Works, 712 Kimball, Danville 18, Illinois.

YOU CAN ENTERTAIN with chalk talks. Catalog 10¢. J. G. Balda, Cartoonist, Oshkosh, Wis.

HOME STUDY

LINGUAPHONE FOR LANGUAGES. At home learn to speak Spanish, French, Russian, German or any of 29 languages by quick, easy Linguaphone Conversational Method. Linguaphone is available under GI Bill of Rights. Send for FREE book. Linguaphone Institute, 73 RCA Bldg., New York 20, N. Y.

INDIAN CURIOS

INDIAN RELICS. 10,000 new items. Lists and arrowhead 10¢. Williams, 405 Monroe Street, Green Bay, Wis.

4 FINE ANCIENT Indian Arrowheads $1.00. Stone Tomahawk, $1.00. Flint Knife, 50¢. Spearhead, 50¢. List free. Lear's, Box 569, Galveston, Texas.

THE HEAVENS FROM EARTH'S POLES

(Continued from page 156)

the sun, it will be above the horizon continuously, but, of course, invisible without optical aid. In the long twilight of spring and fall one may possibly glimpse this planet near the horizon, if conditions are favorable. Venus will be seen frequently by daylight, even without any optical aid. There will be long months, however, when it will be in the opposite hemisphere and invisible. It will be more easily found in the spring and fall twilight near the horizon than the planet Mercury, because of its great brilliancy. The outer planets, Mars, Jupiter, and Saturn, may be seen for long periods at a time in the winter sky at the pole, but disappear in the rays of the sun in the summer months. There are also long periods when they are on the opposite side of the equator from the pole, and invisible because they are below the horizon. Jupiter, for instance, will remain below the horizon for six years at a time, and Saturn for about fifteen years, and above the horizon continuously for an equal length of time. The periods are, of course, very much greater for Uranus, Neptune and Pluto since they are approximately half the planet's period of revolution around the sun. In 1947 Jupiter will be seen above the horizon at the south pole throughout the entire year, in Libra and Scorpio, and so will be invisible at the north pole. Saturn, on the other hand will be in Cancer and Leo, above the horizon continuously through summer and winter, daylight and darkness, at the north pole, and far below the horizon for the same period at the south pole.

Returning to our mid-latitudes of the northern hemisphere in March we find that the sun will be on the equator, and at the vernal equinox on March 21 at 6:13 A.M., Eastern Standard Time. Spring will then begin in the northern hemisphere and autumn in the southern.

Mercury will be at inferior conjunction with the sun on March 8, when it will pass into the morning sky. It will, however, be too close to the sun to be seen until possibly the last few days of the month, when it will be a few degrees above the eastern horizon at sunrise. Venus is still a morning star low in the southeastern sky at sunrise. Seen in the telescope its phase is gibbous. Mars is now in the morning sky in Aquarius, and too close to the sun to be seen. Jupiter is in Libra and rises before midnight in the southeast. It is not far from Antares in Scorpio. Saturn is in Cancer, the zodiacal constellation lying between Gemini and Leo. It is to the southeast of Castor and Pollux and nearly in line with them. At sunset it is high in the eastern sky and sets before sunrise.

ANSWERS TO "TWO IN THE BUSH"

Answers: 1. raven; Poe's *The Raven;* 2. skylark; Shakespeare's *Cymbeline;* 3. bobolink; Bryant's *Robert of Lincoln;* 4. marsh-hen; Lanier's *The Marshes of Glynn;* 5. dove; Burns' *Flow Gently, Sweet Afton;* 6. thrush; Robert Browning's *Home Thoughts, From Abroad;* 7. nightingale; Keats' *Ode to a Nightingale;* 8. owl; Shakespeare's *The Tempest;* 9. mocking-bird; Stephen C. Foster's *Massa's in de Cold, Cold Ground;* 10. heron; Longfellow's *The Song of Hiawatha;* 11. cock; John Milton's *L'Allegro;* 12. swallow, *The Bible,* Psalm 84.3; 13. skylark; Shelley's *To a Skylark;* 14. albatross; Coleridge's *The Rime of the Ancient Mariner;* 15. owl; Edward Lear's *The Owl and the Pussy-cat;* 16. blackbird; Mother Goose's *Song of Sixpence;* 17. tomtit; Gilbert and Sullivan's *The Mikado.*

HARVESTERS OF THE PLAINS

(Continued from page 149)

ess of one of the worker ants. I was well rewarded for my stoicism. An ant that had crawled on the back of my hand grasped a pinch of skin with her mandibles and then, in slow motion, bent her abdomen under the thorax and thrust the sting into my skin. The effect was violent. When my antics subsided I discovered an intensely itching inflamed area about the size of a silver dollar back of my thumb. At the time no remedy for neutralizing the formic acid injection was available, so "I grinned and bore it." The pain and redness finally disappeared after several hours.

Harvester ants, like many other creatures, have their nuisance value. Because they are prevalent along the highways, where grain from passing trucks is scattered, their mounds occasionally contribute to water erosion on the road shoulder. They also excavate the earth beneath the pavement, causing the oiled or cement surface to sink and crack. In fields, their mounds obstruct mowing machines, and in alfalfa stands their denuded dooryards reduce the area available for hay production. If a colony develops in a lawn, the result is at least unsightly if not exasperating.

Attempts at eradication of harvester ants have been many and have met with varying degrees of success. Cyanides, Paris green, London purple, and ethylene chloride are among the substances that have been used in control measures. Farmers sometimes attempt to trap the ants in jugs, somewhat after the fashion of bumblebee trapping that boys try at least once in their youth. One report in the scientific literature describes the method of saturating the mound with carbon disulphide and then covering it with a tub. But the tubs were stolen. Tests with DDT and other recently discovered insecticides, however, offer much promise for those who believe they are being pestered by harvester ants.

For the botanist the harvester ants are a source of fruitful conjecture. What part does the ant population play in the biotic community? The ants are not confined to their nests and cleared circles and hence are an influence on the vegetation beyond the frontiers of their dooryards. They collect seeds. They cut down plants. They number as many as 10,000 to a mound, and the mounds as many as fifty to an acre. They travel at the rate of more than one hundred feet an hour. Hence literally every square inch of ground is conceivably covered several times each day by ants. And they are active from April until November. Can anyone say they are not an influence in the earth's green cover of plants?

All these things come to me on that recent summer day, with the brassy sun shining down. But my back was now rested and the hole was not finished. It was time to get on with my digging.

Poems from the Farm

Willow Brook Farm. By May Allread Baker. Elgin, Illinois. 1936. Brethren Publishing House. 96 pages. Illustrated by Zeta O. Rodgers. $1.50.

May Allread Baker has, thus far, been represented by one excellent poem in the pages of Nature Magazine. This poem is included in this fine collection of poems. Mrs. Baker is a talented farm wife, a lover of Nature, and endowed with a sensitive understanding of rural life. The poems collected in *Willow Brook Farm* have been described as "distinctly rural as new churned butter, as sprightly as a cricket, as wise as old men whittling." This is a fine description, for, besides being excellent poetry, the eighty or more poems collected within the covers of this little book give the reader a special sort of "lift."

Path of Science

The Path of Science. By C. E. Kenneth Mees. New York. 1946. John Wiley and Sons. 250 pages. $3.00.

As Hitchcock professor at the University of California, Dr. Mees gave a course of public lectures on the development of science in its relation to the history of society. These lectures have been expanded into this book, one chapter of which—that on "The Growth of Biological Ideas" —is written by Dr. John R. Baker, who also contributed critical comment as the manuscript progressed. Altogether this is an extremely interesting and readable discussion of science in our history. Neither author professes to be a professional historian of science, but both are scientists and research men. They have, perhaps because of this, brought an objective treatment to their subject that is refreshing. R.W.W.

KODACHROMES

KODACHROMES sent on approval. Two-inch kodaslides of Colorado and the Southwest. Scenes and nature subjects, 50¢ each. Free list. Paul Nesbit, Estes Park, Colorado.

MAKE-IT-YOURSELF

EASTER EGG decorations—make eggs into animal and doll heads, with paste-on-ears, eyes, etc. Send 10¢ today for Bunny, ask for list. Frances Williams, 5369 Maple Ave., St. Louis, Mo.

WHITTLER'S—Supplies—blanks—special woods—knives. "Old" Whittler, 1402 Charles St., La Crosse, Wis.

MINERALS

"ROMANCE IN STONES." Arizona rare minerals. Collectors or museum grade, 12 miniatures, assorted, colorful, brilliant, genuinely rare, $3. Sam Parker, 2160 East Van Buren, Phoenix, Arizona.

10 All Different Diamond sawed cabachon blanks ready to grind and polish into ring stones, $2.50 postpaid. Minerals and gemstones on approval. Dr. Ralph Mueller, 3701 Valentine, Kansas City 2, Missouri.

"GENUINE" Arizona RUBIES (Garnets). Send quarter for packet. Mineral Specimens Company, Box 2651, Phoenix, Arizona.

MISCELLANEOUS

ATTENTION NATURALISTS! Everyone is applauding the new, fascinating way to study birds, butterflies, etc.! It's the NATUREGRAPH way! Adaptable to field, laboratory and school . . . costs but a few pennies! Write today for free booklet and samples. NATUREGRAPH CO., Box 698, Palo Alto, California.

SEE OUR DISTINCTIVE line of religious gifts. Beautifully bound, richly printed Bibles, choice Christian Books, Artistic Calendars, inspiring Scripture Text Christmas Cards, and many other religious items. For information, write: Inman's Creative Print, 159 So. Main St., Elmer 12, N. J.

POWERFUL MENTAL TELEPATHY, Practical. Free Literature. Elgin Johnson, 912 Benton, Nashville, Tenn.

PHOTO CARDS. Assortment 25¢. List sample free. Lefferts Station, Box 48, Brooklyn 25, N. Y.

RARE GARDEN, FIELD and Tree Seeds. Mexican Products Co., 126 N. Main St., Tulsa 3, Okla.

COLLARFIX: Shirtcollar support 10¢ postpaid. Herr Metal Products, Collinsville 1, Illinois.

LADIES GENUINE ALLIGATOR hand bags, size 10½" x 8¾", $24.95 postpaid. Moises Rodriguez, Apartado 2497, Havana, Cuba.

IDENTIFY and PROTECT your garments and linens with washable "Heat-It-On" name tapes. Applied easily with hot iron. 75 per $1.00. Arrow Label Co., Box 31, Sta. P., Brooklyn 12, N. Y.

MUSICAL INSTRUMENTS

PIANO Students! Self-Instruction in the chords $2.50. William Otto, 4215 Park Ave., Union City, N. J. Sample Lesson 10¢.

OZARKS

RAYBURN'S OZARK GUIDE, Eureka Springs 3, Arkansas. Year, $1.50. Copy, 50¢.

PERSONAL

OIL PAINTING from your favorite photo. Send photo for pencil sketch and estimate. F. Longfellow, Lambert Lake, Maine.

PETS

30 VARIETIES—PIGEONS, Rabbits, Pheasants, Peafowls, Doves, etc. Catalog 10¢. Houck's Farm, Tiffin, Ohio.

PHOTO FINISHING

CENTURY delivers work and service that can't be beat. Sixteen Famous Century-Tone prints each snap. roll 30¢. FREE Mailers. Century Photo Service, La Crosse, Wis.

DEVELOP, PRINT, ENLARGE own Films. Simplified easy instructions. One dollar. Fred Carpenter, Box PP, Hamlin, Texas.

PLANTS

GROW GLADIOLUS. Enjoy Orchid beauty. 30 prize winners $3.50 postpaid. 20 recent introductions $4.50 postpaid. Frank DuBois, Southport, Conn.

CACTUS RARE UNIQUE FROM WORLD ORIGINS. 10 for $1.00! Coover's, Orlando, Florida.

NATIVE rhododendrons, azaleas, evergreen, perennials, orchids, ferns. Catalog. Three Laurels, Marshall, N. C.

PRINTING

PRINTING MACHINERY, Type, Supplies. Lists 3¢. Turnbaugh Service, Loysville, Penna.

RABBITS

$2,500.00 Yearly raising ANGORA RABBITS for us. Contract, particulars free. Wilson's Angoras, 1065 Shryer St., St. Paul 8, Minn.

SCIENTIFIC EQUIPMENT

LABORATORY Supplies. Chemicals and Apparatus all descriptions. 36 page book 10¢. Standard Science Supply Co., 1232 N. Paulina St., Chicago 22, Illinois.

AMAZING magnet lifts sixty times own weight! Extremely useful; only 25¢ including interesting literature illustrating time-saving applications. Eyrich, Box 849-N, Milwaukee, 1, Wisconsin.

SEA SHELLS

SHELLS FOR SALE. Land and Marine; Cape Cod. Special 12 for $1.00 in box; Lists on request. Mrs. F. K. Hadley, Box 33, West Newton, Mass.

LATEST: Make beautiful CAMEO sea shell brooch earrings, easily. Complete kit $1 postpaid. Big complete jewelry making kit $3.50 postpaid. Shellcraft instruction booklet 35¢. Wholesale price list. Shelart, 3027½ 6th St., South, St. Petersburg, Florida.

ARE YOU INTERESTED in Sea Shells? New Directory of collectors being prepared. Registration free. Price final list $1.50. John Q. Burch, 4206 Halldale, Los Angeles 37, California.

3000 BARGAINS, Firearms, war relics, binoculars, catalog 40¢. John's Gunshop, Runnemede, New Jersey.

STAMPS FOR SALE

1,000 GRABBAGS, 15¢ each. Special Bags 25¢. Andy, 630 Bingaman, Reading, Pennsylvania.

TAXIDERMY

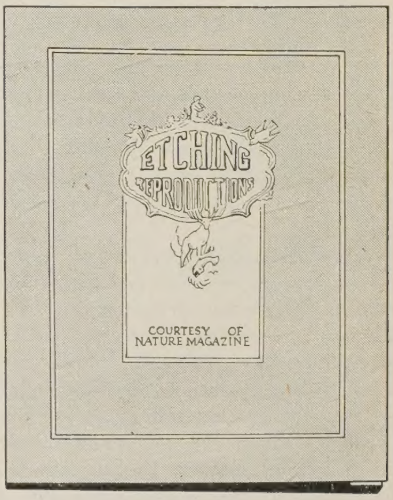
GLASS EYES. Made in OUR factory. All kinds of Taxidermists' supplies. Complete catalog FREE. J. W. Elwood Co., 223 Elwood Bldg., Omaha, Nebraska.

WRITING

SELL IN THREE MONTHS OR MONEY BACK If you can write correct English—You can write Juveniles. I have sold some 3000-3500 stories . . . articles . . . editorials . . . serials . . . series. Now I'm teaching. "Instruction—Criticism—Collaboration." Write Dept. N for terms. Will Herman. Author of "My Juvenile Success Secrets" and "My Formula for Fiction." 5703 Broadway—Suite No. 4, Cleveland, O.

I WANT New Writers to cash hundreds of checks for $1 to $100, offered each month. The easiest way to write for pay. No previous experience necessary. Send for free details. No obligation. Saunders M. Cummings, 467-N1 Independence Building, Colorado Springs, Colo.

Portfolios of Etching Reproductions



Ready to Frame

Eight Nature Etching Reproductions 9 x 12 inches in size, carefully selected from a large number of the best works of famous etchers of wild life, and inserted in an attractive portfolio.

★

The Finest Work of Famous Etchers

★

They are exceptionally fine copies. Framed, it will be difficult for the keenest eye to distinguish any of them from an actual print of the original engraving. The subjects are varied, done by outstanding nature artists.

Will Simmons . Polar Maternity
Diana Thorne . Making a Beseech
Richard E. Bishop . The Osprey
Charles Emile Heil . Chewinks
Winifred Austin . Pheasant Brood
L. R. Brightwell . Not Interested
Roland Clark . Gathering of the Clan
Carl Rungius . Lord of the Canyon

$1.00 a set, postage prepaid

These make attractive and inexpensive gifts.

Send your order today

AMERICAN NATURE ASSOCIATION
1214 16th St., N.W., Washington 6, D.C.

Under the Microscope

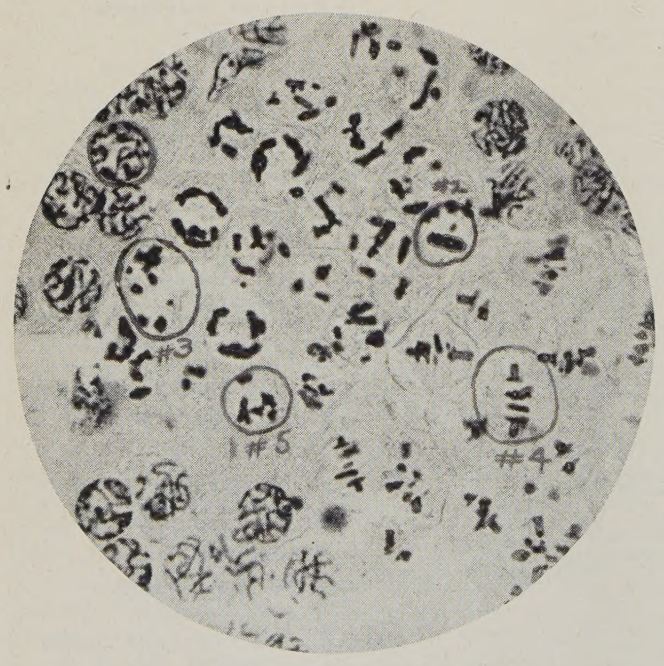
By JULIAN D. CORRINGTON

SPERMATOGENESIS

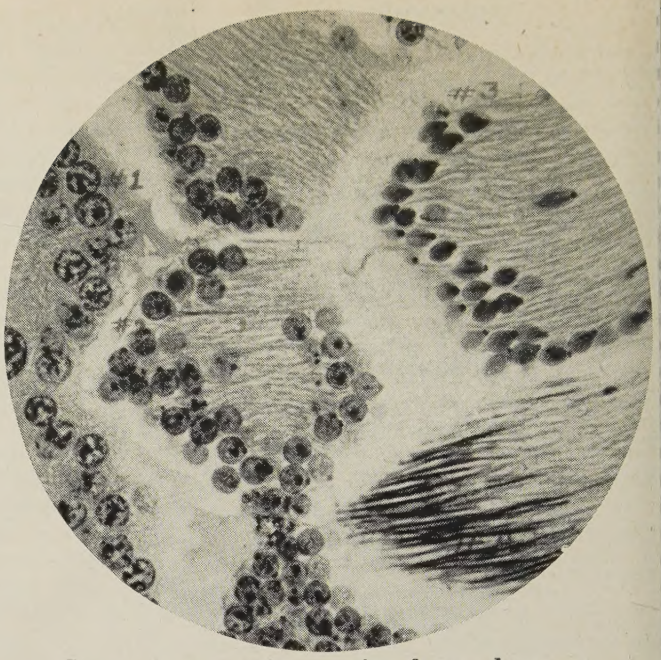
ONE WOULD imagine that the story of embryology, or the development of any organism, such as man, would begin with the instant of fertilization of the egg. When a sperm enters an egg a new individual comes into being; the combination cell is termed a fertilized egg or *zygote.* Details of this event constituted our feature article in the November, 1945, issue.

The fact is, however, that in order to comprehend what happens in fertilization and the subsequent formation of an embryo, knowledge of the architecture of both the sperm and the egg is essential. These sex cells are called *gametes* in general biology and *germ plasm* in theoretical discussions dealing with evolution, development, and heredity. Both the egg and the sperm undergo a development of their own, the stages of which are comprised by the term *maturation,* or the becoming mature. Events common to both gametes are designated by the convenient word, *gametogenesis,* while in considering each sex separately, the appellations are *spermatogenesis* and *ovogenesis* or *oögenesis.* In successive articles we shall consider some of the more interesting features of each of these vastly important happenings in the life of any of us, be we mice or men.

The fully-formed sperm cell or *spermatozoön* (seed-animal) is tadpole-shaped in man and many other mammals, whip-lash shaped or very elongate in the grasshopper. The head contains the nucleus, the body or middle-piece the centrioles, and the tail is mainly a long vibratile flagellum, for propulsion. This cell is one of the most highly differentiated and complex of all cells in the body, and does not at all resemble the spherical cell from which it arises. The ovum, or egg cell, on the contrary, remains more or less spherical throughout its career.



Stages in first meiosis of grasshopper spermary.



Stages in spermiogenesis of grasshopper.

A favorite subject for studying spermatogenesis is the grasshopper. In these insects the testis is elongate, with many lobes, each of which, if sectioned lengthwise, will reveal all or most of the stages of maturation. At the upper end of a lobe are a number of large cells, the *spermatogonia,* which are continually dividing by mitosis, increasing their number. The daughter cells are pushed along the lobe toward the far end, undergoing as they proceed the changes that constitute maturation. These daughter spermatogonia grow and begin a long and complicated prophase of a mitotic division, and when this is evident, the cells are termed *primary spermatocytes.* They are destined to divide twice, and only twice, in their further career. Since the divisions do not follow the plan of a typical mitosis, they have been distinguished by the special term, *meiosis.* One of these two meioses during maturation will be equational, the other reductional.

The *equational division* is like an ordinary mitosis as far as chromosome number is concerned. At the metaphase, or earlier, each chromosome splits in two lengthwise, doubling the number, so that each resulting daughter cell will receive half of each chromosome, maintaining the same number of these bodies in every cell, from generation to generation of successive mitotic divisions. The daughter chromosomes maintain full size by growth. The stages of a normal mitosis were described in our November, 1942, issue.

A *reductional division* is one in which the chromosomes do not split; instead they merely separate from one another, half going to one pole of the spindle, half to the other. By this device, the daughter cells receive only half the number of chromosomes characteristic of the species; the number has been reduced. This performance is essential once, and just once, in the life of every organism that reproduces by the sexual method.

If the mature sperm contained the full number of chromosomes—let us say, by way of illustration, 8 chromosomes, as in *Drosophila,* and the mature egg also had 8, then upon fertilization the zygote would have 16 chromosomes. In the next generation, a sperm with 16 fertilizing an egg with 16 would produce a zygote with 32, and so on, the number doubling with every generation, soon reaching an impossible estate. To prevent this, all organisms reproducing sexually have a reduction division, occurring in the spore mother-cells of plants and in the gametes of animals. All cells of the body of *Drosophila,* for example, including the primary sex cells, have 8 chromosomes, made up of 4 from the father and 4 from the mother. There is thus a double set of chromosomes, desig-

nated as the *diploid* (two-fold) condition. The mature sperm or ovum, after the reduction division, has the *monoploid* or single-set condition, 4 chromosomes in this case. Upon fertilization, there is again the diploid state, 4 contributed by the sperm, 4 by the egg. For each sort of chromosome from the father there is a corresponding chromosome from the mother; they are paired, or occur in *homologous pairs* or mates.

The grasshopper, in common with many other animals, undergoes an advanced type of maturation by *tetrad formation*. In this scheme, the two meioses are rapid, successive, and very differently managed than in an ordinary cell division. All of the arrangements for dividing up the chromosomes for two successive divisions that will result in four cells, are accomplished during a lengthy and complex prophase for the first division, quite unlike the usual mitotic prophase.

The chromosomes form out of strands of chromatin and are diploid in number; then they come together in pairs, an event termed *synapsis*. From what happens later, as well as from breeding results, it is evident that these conjugating pairs of chromosomes are homologous. Chromosome *A* from the father synapses with chromosome *a* from the mother, *B* with *b*, and so on. After synapsis, each apparent chromosome is thicker and there are only half as many visible; but this is only the superficial appearance. The paired chromosomes are so closely applied that they seem single, but they do not fuse; their number is still the same and diploid.

Next each synapsed pair splits lengthwise, and this split must be along a plane at right angles to the line of conjugation of the two mates, since at several subsequent stages each unit or single body can be seen to be made up of four parts. Hence they are called tetrads. The chromosome number has been doubled by this splitting, and there are now four sets in each cell, a condition termed *tetraploid* (fourfold).

In this manner, while still in the prophase of the first division, all arrangements have been made to parcel out daughter chromosomes in each of the two succeeding meioses. Each one of the four resulting daughter cells gets one chromosome from each tetrad. Two methods of separation are possible. If, in the metaphase of the first division, the tetrad containing chromosomes *AA* and *aa* line up on the spindle in such a position that when the components separate in the anaphase, *AA* go to one pole and *aa* to the other, then the two daughter cells receive unlike units and the division is reductional; if, on the other hand, the tetrad lines up so that at disjunction *Aa* go to one pole and *Aa* to the other, then both daughter cells receive exactly the same chromosomal material, and the division is equational.

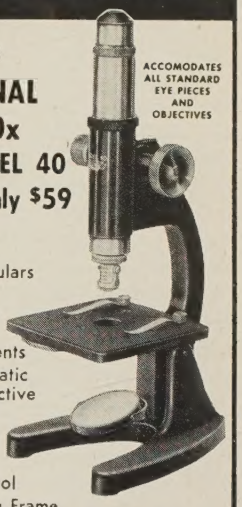
Let us follow through the first case—a reduction division. The chromosome group going to each pole, *AA* and *aa*, is a *dyad* (two bodies), a companion term to tetrad. The cells receiving them are *secondary spermatocytes*. The next division follows rapidly, without preliminaries, since these are unnecessary. In secondary spermatocyte #1, which received the *AA* dyad, these two chromosomes are disjoined in the anaphase of the second maturation division, one *A* going to one pole, the other *A* to the other pole. The resulting cells are called *spermatids*, and the single chromosomes are *chromatids*. The term monad would seem appropriate but is used in other connections in biology. Each spermatid receives one *A* chromatid, and is monoploid. In spermatocyte #2, the *aa* dyad is likewise disjoined in the second meiosis, each resulting spermatid having one *a* chromatid.

To go over this performance once more, let us follow this time a case in which the equational division comes first. In the primary spermatocyte, the tetrad lined up so that *A* and *a* went together to one pole at division, and the other *A* and *a* to the other pole; both secondary spermatocytes received *Aa*, and are alike. In the second division, *A* disjoins from *a* in each cell, one spermatid in each instance receiving an *A*, the other an *a*. Thus, the second division is here reductional. In some animals, the first division appears to be reductional (*prereduction*) and the second equational; in others it seems that the first division is equational and the second reductional (*postreduction*). The end result is the same in either case; half the spermatids will have the *A* chromatid, the other half the *a* chromatid, but each will be monoploid, having only one of the *AAaa* tetrad.

As far as the chromosomes are concerned, the spermatid is a mature male germ cell, monoploid, and presumptively able to fertilize an egg. However, there are transportation and penetration problems involved; it is necessary to bring the two germ cells together, and for this purpose either the sperm or the egg or both would have to possess motility. Another requirement is the storage of sufficient food, so as to supply the developing embryo up to the time when it can obtain food from some other source. These two needs are incompatible. Taking on a cargo of stored food—the yolk—loads a cell down so that it could scarcely be actively motile. In the gametes of higher animals we have one of the finest examples of the principle of division of labor: the male cell contains no stored food, and becomes slender, small, stream-lined and motile; the egg remains spherical, becomes large through the storage of food, and is nonmotile. To accomplish the changes es-

STUDY NATURE... DO LAB RESEARCH *in Your HOME*

with this PROFESSIONAL 50x–300x *FEDERAL* MODEL 40 MICROSCOPE only $59



- 2 Tapered Clear View Oculars
- Direct Reading Drawtube
- Coarse and Fine Adjustments
- 10x–20x Achromatic Objective
- Standard Society Objective Thread
- Disc Diaphragm Light Control
- Rugged Full Tilting Frame
- Optically Ground Mirror
- Large Size Stage (4" x 4")

At Scientific—Photographic & Department Stores

Attractive metal carrying case available, $8.50

FEDERAL **Federal Manufacturing and Engineering Corp.**

Makers of Federal Cameras and Enlargers

213 STEUBEN STREET • BROOKLYN 5, N. Y.

The Wilderness Society

invites you to become a member and a supporter of its work for the preservation of our few remaining wilderness areas. THE LIVING WILDERNESS, *an illustrated quarterly edited by Howard Zahniser* (NATURE MAGAZINE'S *Book Editor), is sent to all members. Subscribers also are welcome. Dues (or subscriptions) are only $1.00 a year.*

THE WILDERNESS SOCIETY
1840 MINTWOOD PLACE, N.W., WASHINGTON 9, D. C.

sential to meet these requirements, the spermatid gradually condenses, elongates, and develops a flagellum or long whiplash, the complex series of transformation stages being designated as *spermiogenesis.*

The accompanying illustration of meiosis shows a number of primary spermatocytes, in various phases of the first maturation division, as seen under high dry magnification. Cell walls and cytoplasm are faint, the prominent, spherical bodies being nuclei. Under very high power and in favorable places, the threads of such cells as #1 may be seen to be tetrad. In the stage represented by cell #2, the threads have condensed, shortening and thickening into very definite chromosomes, actually tetrads of four chromosomes. Many of these appear double, at least in part, in the illustration, and several, as the one labeled, are seen to exhibit *strepsinema,* a condition in which homologous chromosomes are wound about each other spirally. This provides the physical basis in cytology for the genetical phenomenon termed crossingover. When the twisted parts separate, they exchange pieces, accounting for some of the results achieved in actual breeding experiments. Cell #3 contains a "cross," rather than a twisted "loop," and shows four parts somewhat more plainly than other tetrads in the field. Cell #4 and its neighbors are in the metaphase of the first meiosis. The tetrad at the top and that at the bottom are in the beginning of the process of disjunction, the two dyads starting to pull apart, to be drawn to opposite poles of the meiotic spindle. Cell #5 shows, standing alone at the top, the X-chromosome, which is responsible for sex determination.

The other illustration, on spermiogenesis, depicts a number of nests of cells, those in each nest being in the same stage of development; earlier stages at the left, latest at the right. Cell #1 is a spermatid before starting its change of shape; #2 is in the "toy balloon" or "Chinese lantern" stage, with the nucleus forming the spherical head, a prominent black centriole lying against the nuclear membrane, and the flagellum taking its departure from the centriole. The gray streaks in the middle and righthand nests are all sperm tails. Cell #3 is in the "electric-light-globe" stage, the nucleus now much darker and concentrated, beginning its elongation, and #4 is a mature spermatozoön, with the nucleus forming a very long black rod.

The subject of gametogenesis is not simple or easy and requires repetition of study before the essentials are mastered. We will meet with many of the same events in the next installment, on ovogenesis; likewise with certain happenings that are peculiar to the egg. Regular readers of this Department who find the going a bit rough this month will discover the answers to some, at least, of their questions in the following issue, and can gain a notion of the main essentials in this basic chapter in embryology.

ADVANCED HINTS

First-class slides of spermatogenesis are not easy to make; the microscopist should first have had some experience in routine sectioning and staining before tackling this subject. Like anything else, however, practice makes perfect, and those with a bit of training may well try their hand at this somewhat advanced technique.

Secure specimens of male grasshoppers, crayfish, or salamanders, remove a testis and slit it lengthwise, placing the halves in a Flemming mixture, or in Hermann's, Orth's, or Bouin's for fixation. Cut thin paraffin sections lengthwise of the organ and stain with iron hematoxylin. Some prefer to add a counterstain, such as Bordeaux red, fast green FCF, or orange G. If Hermann's solution is available for use as a fixer, Guyer recommends the safranin-gentian violet staining combination for especially beautiful results. The photomicrographs shown with the feature article this month were made from slides stained with iron hematoxylin, without a counterstain.

BEGINNER'S PRIMER

A family of flies, members of which are familiar to everyone, is the Tabanidae, or Horseflies. It is well-nigh impossible to walk down any woodland road or along a shaded watercourse in the summertime, in most parts of the world, and avoid being pestered by these large bloodsuckers. They are exceedingly swift on the wing and persistent in their attacks upon all of the larger mammals, including domestic species and man.

As is the case with mosquitoes, it is the female that is the predator, males sipping nectar from flowers or sap from wounds of trees. Unlike mosquitoes, however, the females are able to feed on nectar and sap when victims are not available for a blood meal.

The common large black or mourning horsefly of the eastern United States, *Tabanus atratus,* is a very favorable subject for a number of easily made slide preparations. The wing is large, clear, and prominently veined; the leg stout, long, and furnished with spurs, pulvilli, claws and empodium. Because of its size, dark color, and opacity, the leg must be potashed before dehydration and clearing. Chief interest centers in the mouthparts of females, beautifully adapted for their task of piercing-sucking. The maxillae resemble swords and are provided with prominent palps, the mandibles are lancets, and the labium forms a stout proboscis. This apparatus is not difficult to dissect out and mount with the various elements symmetrically separated.

Some two hundred species of the genus *Tabanus* are known for North America alone, while about 2500 species have been described for the family as a whole, with the majority in the tropics. Next to *Tabanus,* the genus most familiar to the average person, and certainly to the naturalist, hunter, and fisherman, is *Chrysops* (golden-eyes), a misnomer, since most of them have bright green eyes. These are the deerflies, extremely annoying to man and beast alike. They have banded wings and are smaller than horseflies, but slides made from their parts are equally as interesting.

Parasitologists have placed the tag of vector on numerous members of this family. *Chrysops* has been implicated in transmitting tularemia to man in the western United States, and the loa worm in Africa, while species of other genera are carriers of surra, a trypanosome horse disease, and anthrax, affecting chiefly sheep and cattle. There seem to be no redeeming features that can be credited to the Tabanidae.

Horsefly larvae are large, worm-like creatures usually found in water or mud, and bear no resemblance at all to adult flies. They have a very small head, followed by eleven segments, each of which is prominently ringed with a sort of fluted margin, to assist locomotion. As far as is known, they are predacious on such aquatic animals as snails and other insect larvae. It comes as a surprise to most students of nature when they first learn that these large, stout "worms" are horsefly larvae.